he Quicker—National Combat Winner • RC Duration

MODEL AIRPLANE NEWS

MARCH 1957—35 CENTS

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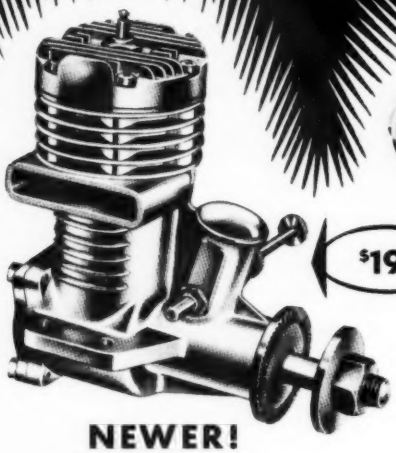
for AIR SUPREMACY . . .
it's FOX power!

NEW!

FOX 29R

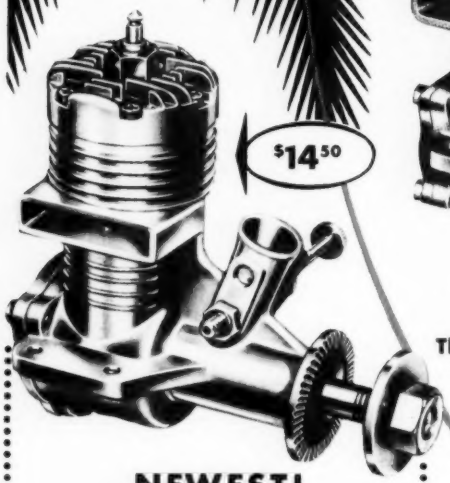
The world's most powerful 29.



NEWER!

FOX COMBAT 35

The world's most powerful 35.



NEWEST!

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The world's most powerful 19.

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An all new 19 FEATURING:

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2 — Durable Fox construction.

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3 — Hardened and ground counter balanced crankshaft.

4 — Splined and hardened non-slip thrust washer.

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6 — Hardened wrist pin with anti friction pads.

7 — Ground, honed and lapped piston and cylinders.

SMART CHAMPIONS CHOOSE FOX

FOX MANUFACTURING CO., Inc.

Designers and Manufacturers of the World's Finest Model Airplane Motors

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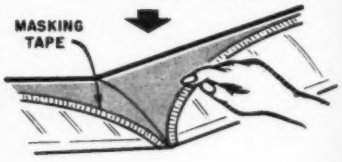
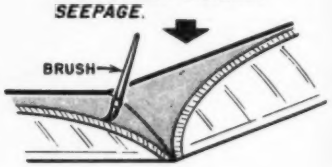
Kinks

COLOR TRIM TIPS

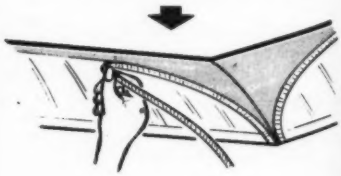
(1) *WHEN APPLYING MASKING TAPE, PRESS INSIDE EDGES FIRMLY AGAINST SURFACE TO PREVENT COLORED DOPE FROM SEEPING UNDER.*

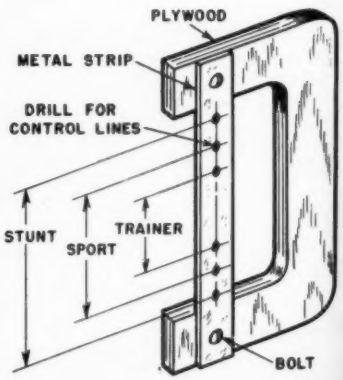


(2) *APPLY A COAT OF CLEAR DOPE TO THE INSIDE EDGES FOR ADDED PROTECTION AGAINST SEEPAGE.*



(3) *REMOVE MASKING TAPE BY PULLING OFF AWAY FROM COLOR, CLOSE TO THE SURFACE, TO PREVENT THE COLOR FROM LIFTING.*





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the "BIG MO"

by **Sterling models**

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This is the "Big Mo" . . . symbol of America's greatness on the sea. Commanded by Admiral Wm. F. "Bull" Halsey, the "Big Mo" spearheaded the attacks on Iwo Jima, Okinawa and Japan . . . On her decks Japan signed the formal surrender ending World War II. Truly the Pride of the Fleet . . . and truly the pride of Sterling Models . . . for here, unquestionably, is our proudest achievement . . . the most authentic, finest replica ever created of this historic ship.

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- Designed from official U.S. Navy blueprints.
- Both 16" and 5" gun batteries are realistically movable.
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For new catalog, send 10c in coin to cover handling and mailing

The United States Navy Battleship

U.S.S. MISSOURI

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27th Year of Publication

MODEL AIRPLANE NEWS

JAY P. CLEVELAND, President and Publisher

MARCH 1957 Vol. LVI—No. 3

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ARTICLES

FEATURES

WILLIAM WINTER, Editor
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by William Winter

► Atom bombs, hurricanes and the like excepted, things don't change overnight. This is especially true of the rules that govern the building and flying of competition model airplanes. (And don't bring up the FAI, please!) Ordinarily you'd no more notice the slow-creeping changes in the rules than you'd expect to photograph the growth of an ear of corn. Resulting from a meeting of many minds, the rules inevitably are compromises, a slow evolution that seeks only to smooth out ambiguities, awkward and impractical features. A radical change is like the gust that suddenly noses up the airplane; depending on its inherent stability, it goes through a number of oscillations which either grow less in magnitude, until level flight is resumed, or the dipsy doddles get out of hand, and the crate splatters. Since each oscillation takes two years under our rules-making process, the American modeler learned the hard way a long time ago that only fools rush in.

But seemingly defying the laws of gravity, here is Pan American's Dallas Sherman, the father of pay load, or PAA Load as he and George Gardner prefer to hear it, walking the tight rope over the Niagara Gorge and calmly exclaiming, "Look, ma, no feet!" The PAA Load rules do change, quickly and radically, with nary a dissident voice. PAA so far has not been encumbered by having to distill the opinion of 20,000 hard-core contest goers before decreeing that a model must carry one more or less ounce of weight. But each time the daring Dallas crosses the gorge he steps more cautiously: he and George have been taking more and more to sampling opinion.

As previous columns have brought out, PAA is troubled about the trend in Clipper Cargo designs. Undoubtedly the most interesting model airplane design problem in the world, the Clipper is now about as big as an old Comet Sailplane, which needed a pretty warm .60, and takes off the ground unassisted with a pay load of more than 40 ounces on Mr. Cox's vitamin-burning .049. Like the indoor model, whose weight is measured in thousandths of an ounce for a three-foot span, the Clipper is an extreme, also putting the burden on supreme skill in structural design and building ability. (Come to think of it, that's becoming a trouble with Wakefield, too). Mixing up real crates and models, it is (*Continued on page* 7)

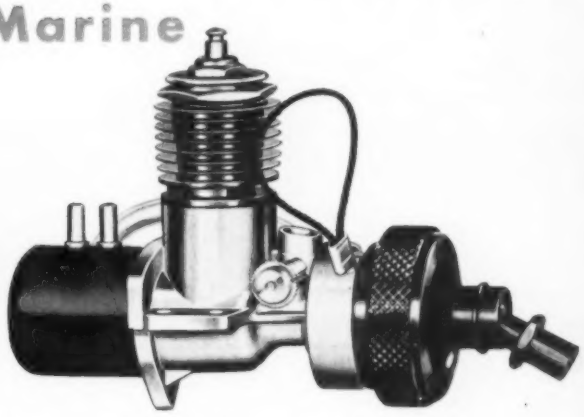
NEXT MONTH'S COVER
FAIRCHILD REGULUS

PLANE ON THE COVER

Stemming from the WW1 Liberty, the US favored liquid-cooled V-engines in the post-war period; the Curtiss D-12 of 500 hp leading to these notable Curtiss racing biplanes, for both Navy and Army. On wheels, Al Williams set a mark of 266 mph. On floats, the machine was designed for Schneider Cup competition.

NOW! 2 NEW OK Cub Engines

Aircraft and Marine



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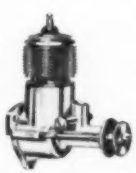

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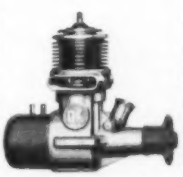

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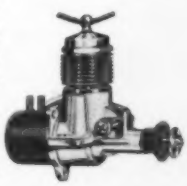

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MAN at Work

(*Continued from page* 4)

understandable that Dallas thinks an airplane isn't an airplane unless it stays together. Practical! Down-wind landings in flimsy Clippers (Cargo, not Boeing, that is) are breath-taking spectacles from which, fortunately, no pilot has to be concerned with walking away.

Most recently released trial balloon talked of a 72-inch span limitation and a 32-ounce minimum empty weight. The pros have been explained. Here's a con; and we quote R. F. Watson, AMA 504 (that makes Watson a member since 1937), of Des Moines.

"The measure of the Clipper Cargo event is not how many survive," states Watson, "or how large they are, or how 'real' they look, but how much they lift! When a ½A-powered Clipper lifts more than 40 ounces, that is something.

"Let's not rule the Clipper event into a kit buyer's contest," he goes on. "The fact that 'flimsy monsters' do not survive is a sufficient limiting factor. Let's not rule out structural design by a minimum empty weight. Size also limits itself, as a large ship at 'survival strength' requires greater structural weight and therefore less cargo can be lifted."

Watson also opposes making Clippers look like real ships because we already have a scale event and asks how many real airplanes would have windows if the occupants were blind dummies. "How would the 'real airplane' look if the stability provided by the pilot had to be built in structurally, etc?" Bathtub cargo containers should be outlawed, thinks Watson, since these encourage flimsy structures. Better to count the total weight on all three flights, rather than just one, says he. Since real planes make thousands of flights, this is valid reasoning. Perhaps Watson is correct when he claims that a three-flight total would make "survival strength" more desirable and "flimsy monsters" a thing of the past.

"The fact that so few Clippers survive the National Contest is to be expected," winds up Watson. "Some are completed only the night before, many have never been fully tested with a full cargo, and only a few have runway facilities for ROG tests. Flimsy Clippers crack up because of designer error, not rules failure.

"As to the 72 inch over-all measurement and 32 ounces empty weight suggestion, brother! Think how many Class B-C flight ships would appear as Clippers. Who would be foolish enough to design for Clipper only. Clipper Cargo would become just another event. Let's not have this happen."

• • •

► Since the days of the Berkeley Cavaliers and the Brown Junior engines, the Green Bay Model Fliers have been flying like crazy all winter long on the frozen bay, just north of town. A few days or so ago, as you read this, they held their annual Jamboree Free Flight Contest (February 3). Made to order for free flight, this ice-pack flying field gives a two by four area—them's miles buster. Despite the harsh northern winters, RC in Green Bay is more active in winter than in summer—that goes for free flight, too. As contest director Bob Cowles (224 Oak Hill Dr., Green Bay, Wis.) puts it: "Old man Winter (he does not mean your youthful editor) is providing our flying field, the Park Commission—the warming house."

• • •

► When Defense Secretary Wilson spelled out which Armed Service had jurisdiction over what aviation, the New York Telegram remarked facetiously, if loosely, that the Army, having lost its airplane program, had taken up model airplanes. The Department of the Army has indeed announced a 1957 All-Army Meet, sponsored by the Adjutant General, and sanctioned by the AMA. Conducted at all levels of command, as part of the Army Crafts program (in Esperanto this may mean that a private can top a general's 141 mph in speed and not lose hope for his Private, First Class). The Army rightly figures this program will provide recreation and entertainment and encourage the formation of clubs—to stimulate interest in Army aviation. (Army still has a sizable aviation program).

Each area level command may enter a 12-man team, who compete in the all-Army finals. Most gas-powered events are listed, and hand-launched glider. No rubber. In addition, each area level can submit three entries in a "special scale models of Army aircraft," to be conducted and judged in Washington, D.C. Scale models of Army airplanes and helicopters currently in use, with spans of 12 to 24 inches, are eligible. Judging based upon fidelity to scale and workmanship. The three winners (the models, of course) will be kept by the Army and put on display in the Pentagon. AMA rules apply otherwise, except that there is no age limit.

The Air Force already has a modeling program with an Air Force Nationals, the best men then competing in the regular Nationals. Unlike the Air Force and the Army, the Navy looks ahead and aims at the outsider, with an eye on future pilot requirements.

• • •

► This had to happen. An engine for combat! (And when will someone make a good RC engine?) Duke Fox has come up with a real nitro burner. This is the Fox Combat Special, designed for use with the new Fox high-nitro fuel. An ordinary Fox .35 on Fox Superfuel (which is one of the good fuels to begin with) turned 10,200, 12,000, and 14,000 respectively on a Top Flite 10 x 6, 9 x 6, and 8 x 5. The Combat Special ups that to 13,000, 14,800, and 18,000. For use with the high-nitro content fuel, the engine had to have high compression. It's cool running, Duke claims, with no overheating problems. The technical description we'll leave to maestro Ted Martin for later, but among the important features is a ½-inch diameter, aircraft quality, bronze main bearing, cast and not powdered, honed to fit; and construction that eliminates bind from cylinder attachment, etc., so often the cause of break-in and wear problems. For real gone addicts, there's a stud on the rear cover to take the Fox 29R needle valve assembly for use with pen-bladder tanks. By taking out the venturi insert, an additional 500 rpm is possible. Imagine what combat will be like?

• • •

► Any connection between these "plugs" and advertising is purely coincidental. Won't say that no one else can make that statement, but no-strings attached publicity is unusual. First, then, the book Aircraft Camouflage and Markings, 1907-1954, imported by Gull, published by Harleyford, England. MAN finds this extraordinary book a remarkably fine reference. Space won't permit a full-fledged review but let us say simply that it has 212 pages of the finest coated paper, numerous pictures of a large number of service airplanes and their markings from the early days up to now. Twenty pages of full color work, comprehensive, well organized text, round out a typically thorough British job. Hate to admit it, but some of the crates

(*Continued on page* 39)

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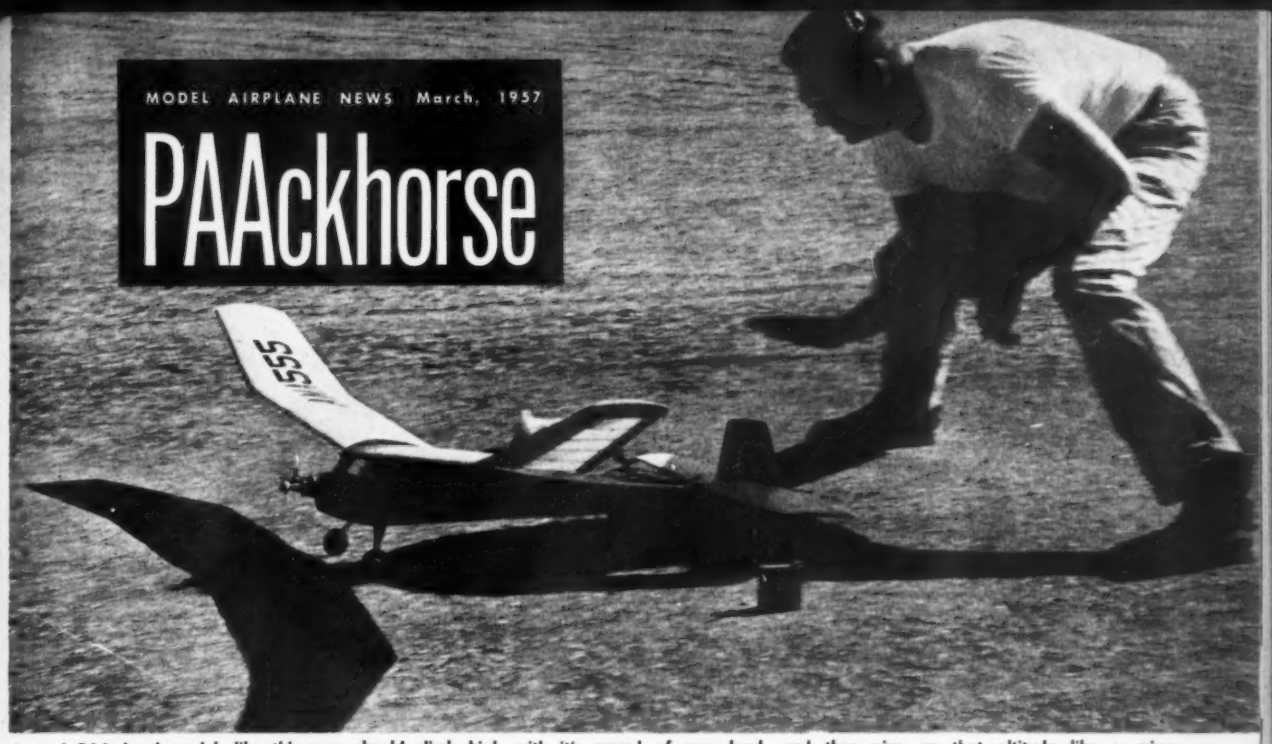
MODEL AIRPLANE NEWS March, 1957

PAAckhorse



A good PAA Load model, like this one, should climb high with it's pound of pay load, and then give up that altitude like a miser.

Features to note: Cessna type gear guarantees good take-offs; a tide-winder engine mounting minimizes exhaust-mess on airplane.

Without the pay load, the PAAckhorse will give the contest type free flights a real run for their money. Then try a .19 or .23.

by STANLEY D. HILL

For International Class competition in Pan American's PAA Load Event, this superbly designed machine is a joy to build and fly.

► The PAAckhorse is a ship designed with attention to realism and yet sacrifices none of its performance in achieving semi-scale appearance.

The requirements for a good PAA-load job pretty much set the specifications for the designer. Not being able to go up like a skyrocket with a pound of payload, clean design and a really excellent glide are doubly important. A generous wing of 600 square inches area, high aspect ratio, and an efficient turbulent-flow airfoil, help the PAAckhorse to use the altitude gained as efficiently as possible.

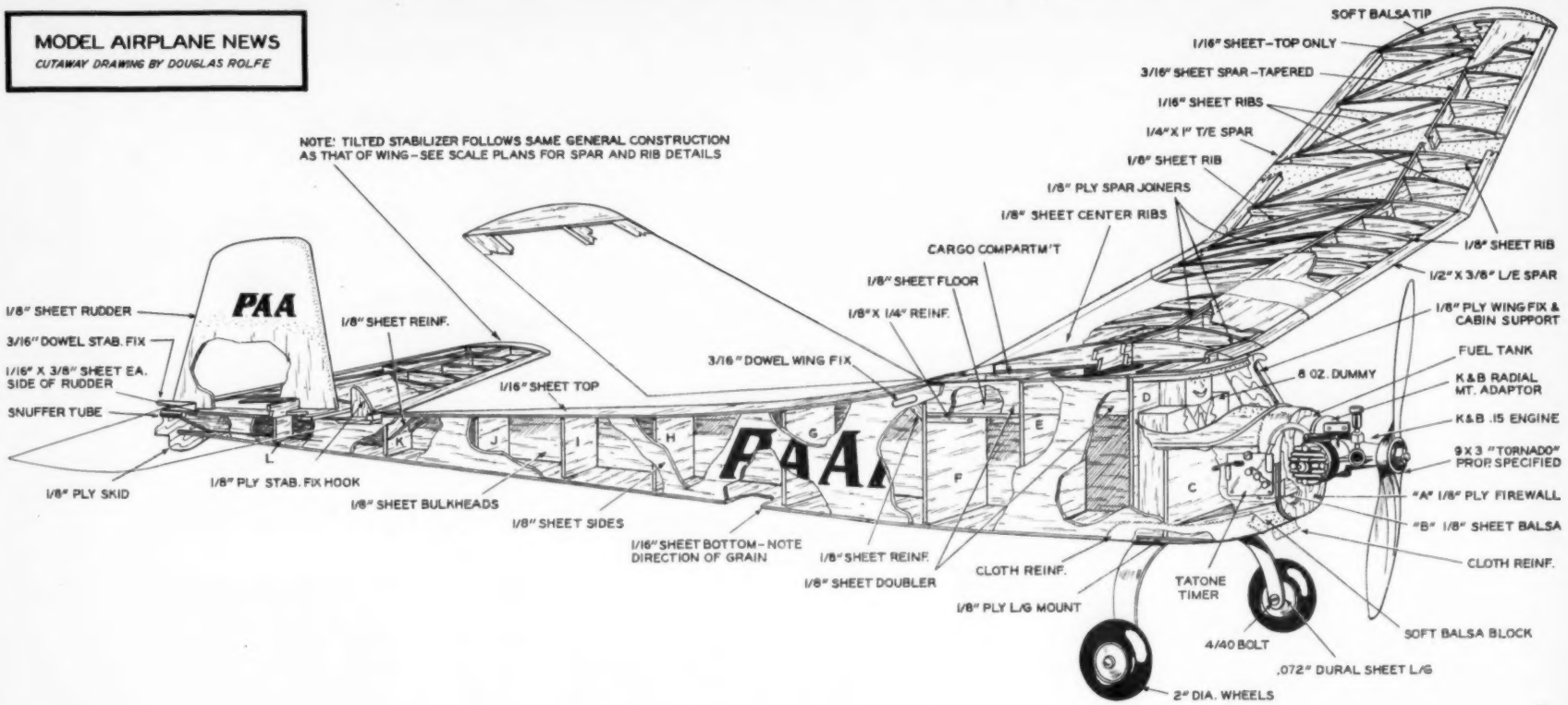
Perhaps second in importance to a PAA loader is a landing gear that will not distort under load and ruin a take-off attempt with a ground loop. The Cessna type gear of sheet dural has proved its merit in handling the weight of RC models and it does equally well at the similar job of getting a heavy PAA-load model "unstuck."

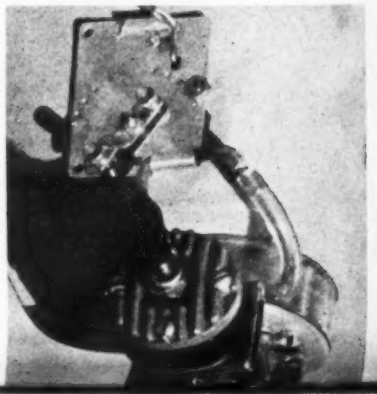
As in any contest ship, emphasis has been placed on simplicity and rapid building with perhaps more than the usual attention given to warp resistance. Once built, this one stays put.

The "sidewinder" engine mounting used is not necessary, of course, but it does minimize oil collection on the ship, and priming and battery attachment or compression adjustment are easier than in the upright position. Without load or with .19 to .23 engines the model is a potential winner in regular free flight events. The PAAckhorse differs little from standard practice in construction or flying and presents no problem in either one.

Let's build it. You will note on the plan that all balsa other than the wing spar is of (*Continued on page* 10)

MODEL AIRPLANE NEWS
CUTAWAY DRAWING BY DOUGLAS ROLFE





Home-made Lucite tank behind the motor mount plate and details of Tatone's timer shown here.

light weight stock. This is necessary to keep the weight of any PAA job down to a reasonable figure. If you must use heavier wood, cut down on sheet thickness on the fuselage sides and leading edges of the wing and stab. Construction is simple enough that we'll mention only the few details that need special note. It's best to build the PAA dummy before the fuselage in order to use it as a guide in fitting bulkheads C and D.

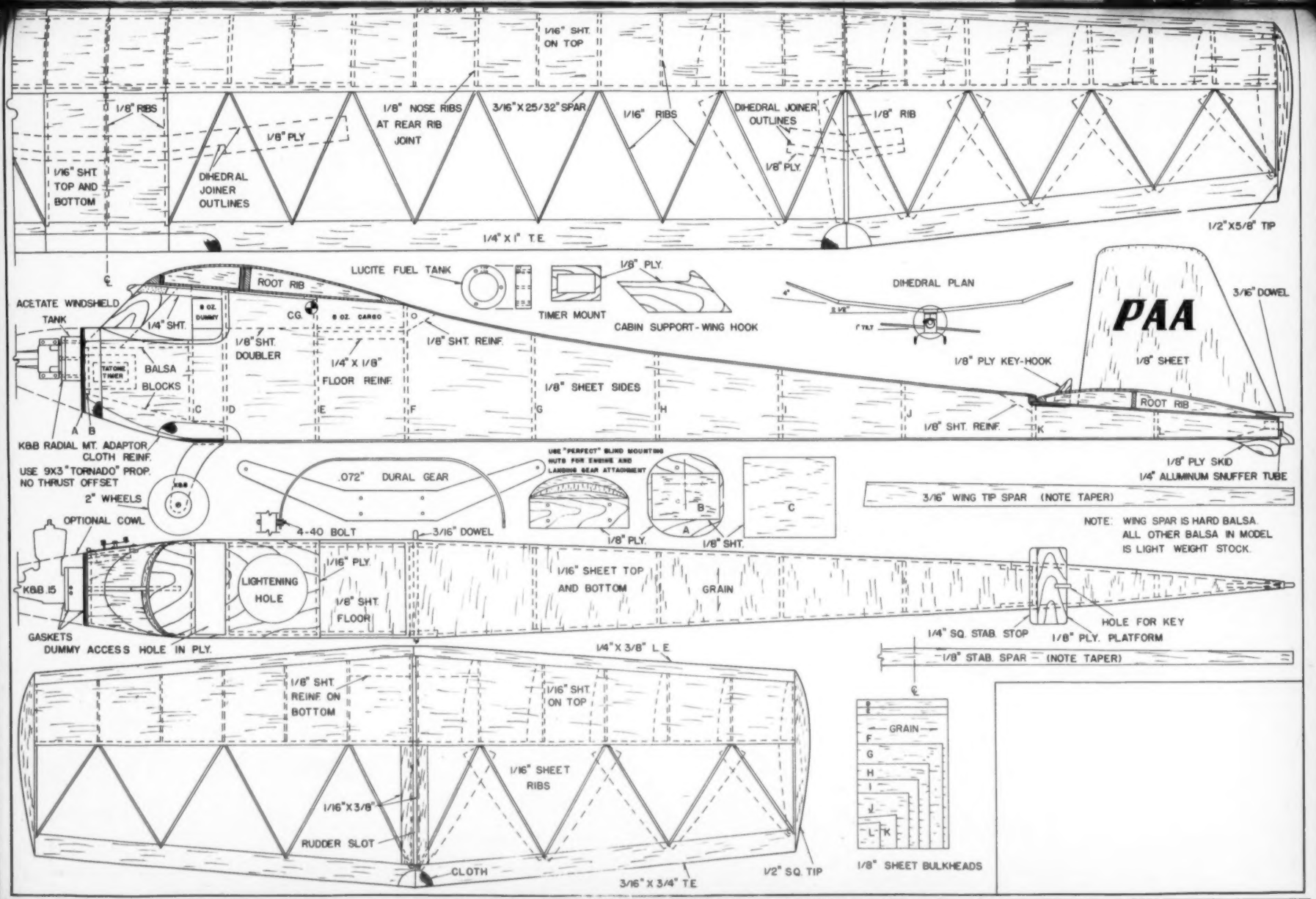
Note that the wing leading edge is sharp and level with the bottom of the wing while the stabilizer leading edge is rounded in the usual manner with its entry point ¼" above the lower surface. I prefer to use silk covering for its strength. However, Jap tissue and four coats of clear dope is adequate due to the model's structural rigidity and is an ounce or so lighter than silk.

The fuel tank is cut from ¼" LUCITE (or laminations of ¼" using ethylene dichloride as cement) with a coping saw, filed and sanded with successively finer grades of sandpaper (2/0, 5/0, 8/0, 400) and then polished with rubbing compound or buffed. Use an extra crankcase gasket between the engine and the radial mount adaptor, a ring gasket between the adaptor and the tank and a full disc gasket between the tank and the firewall. If very high nitro content fuels are used, drain the tank between flights to prevent softening the plastic.

For the 8 oz. cargo, a box of ¼" balsa fitted to the compartment works well. Load the box with BB shot and a little cement to a weight of 8 oz., then cover with silk and dope as the rest of the model. The loss of weight from evaporation of the cement will be made up for by the silk and dope.

Flying any PAA loader is far easier than a hot FF job and the PAAckhorse is no exception. *With the load in place* and the CG at 3⅜" from the trailing edge, trim for a flat glide with a gentle right turn by varying stabilizer incidence and position of the whole rudder. There should be no rudder offset, stab tilt being

(*Continued on page 47*)



FULL SIZE PLANS AVAILABLE. SEE PAGE 56.

Timer, timer! Oh, go away, will ya! Don Baity, grandstands from a lawn chair placed in shade.

Shop talk goes over big. With experts like Walt "Doc" Good on hand to answer questions, natch.

Making the rounds to see what the other guy has is novel aspect of these fly-for-fun deals.

the Gang's ALL Here!

by JAMES THRIFT

Something new in model meets has been pioneered by the RC boys who hold fly-togethers just for the fun of it. No one wins but everybody wins! Not bad idea.

(Editor's Note: Beginning with Selinsgrove, Pa., five years ago, the RC fliers have been enjoying fly-together's in all parts of the country. What's to stop free flighters, ukie fans, even Wakefielders, from doing the same thing? And maybe tossing in some record trials on the side. This article is an account of a get-together held during the last flying season.)

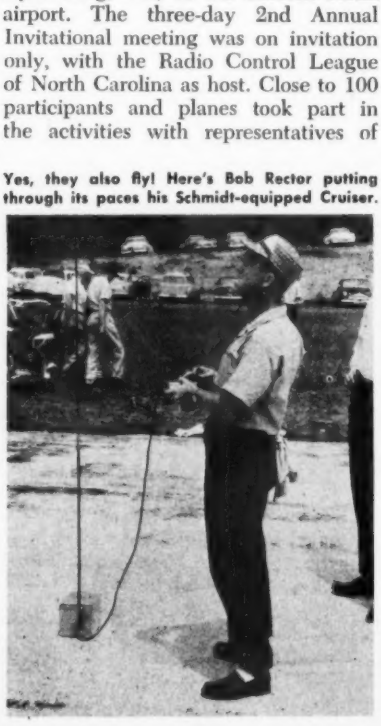
► One of the outstanding Eastern RC fly-togethers of 1956 was held in Lynchburg, Va., at the Preston-Glenn airport. The three-day 2nd Annual Invitational meeting was on invitation only, with the Radio Control League of North Carolina as host. Close to 100 participants and planes took part in the activities with representatives of RC clubs from seven States.

Weather for the entire three days was perfect, and with planes flying on 27, 465, 220, and 50-54 Mc bands, the sky lanes over the airport were kept busy. Everyone got in plenty of flying time.

Since the meet was held on their home grounds, the Lynchburg club had charge of the meet, which included field arrangements, motel accommodations, retrieving service, a banquet, refreshments, entertainment, and so on. The smoothly run event was informal from start to finish; no one was hamstrung with rules and regulations. All flying was stopped two periods each day to allow for any checking of transmitters and equipment.

A banquet was held on Saturday

Yes, they also fly! Here's Bob Rector putting through its paces his Schmidt-equipped Cruiser.



The mobile workshop, pipe and all, and the five-year old Cameron-powered original, the author's.

Who's on 27? Who isn't? Champions dominated a list of almost 100 ships. Everybody had chance.

Buccaneer's still around! Floyd Roberts holds, team-mate Claude Stamper checks take-off.

Warm sun, gentle breeze, plenty of room to spread out. Three Durham boys get organized.

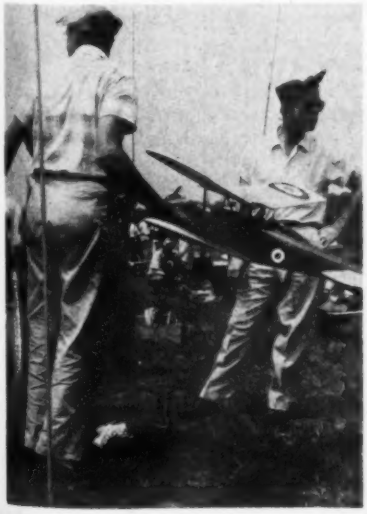
night at Howard Johnsons Restaurant adjacent to the motel headquarters. Here all participants, with their wives, children and other guests, were formally introduced. Movies, and color slides of RCNC activities were shown. RC activities were discussed.

One of the more satisfying aspects of a meet of this kind is the informality of the whole thing. No one needs to be in a hurry, there are no deadlines to make, the feverishness of competition is absent, participants are more receptive to small talk, consequently exchanging of ideas goes on constantly as questions are asked of one another, and the different types of equipment and techniques in building and flying are observed.

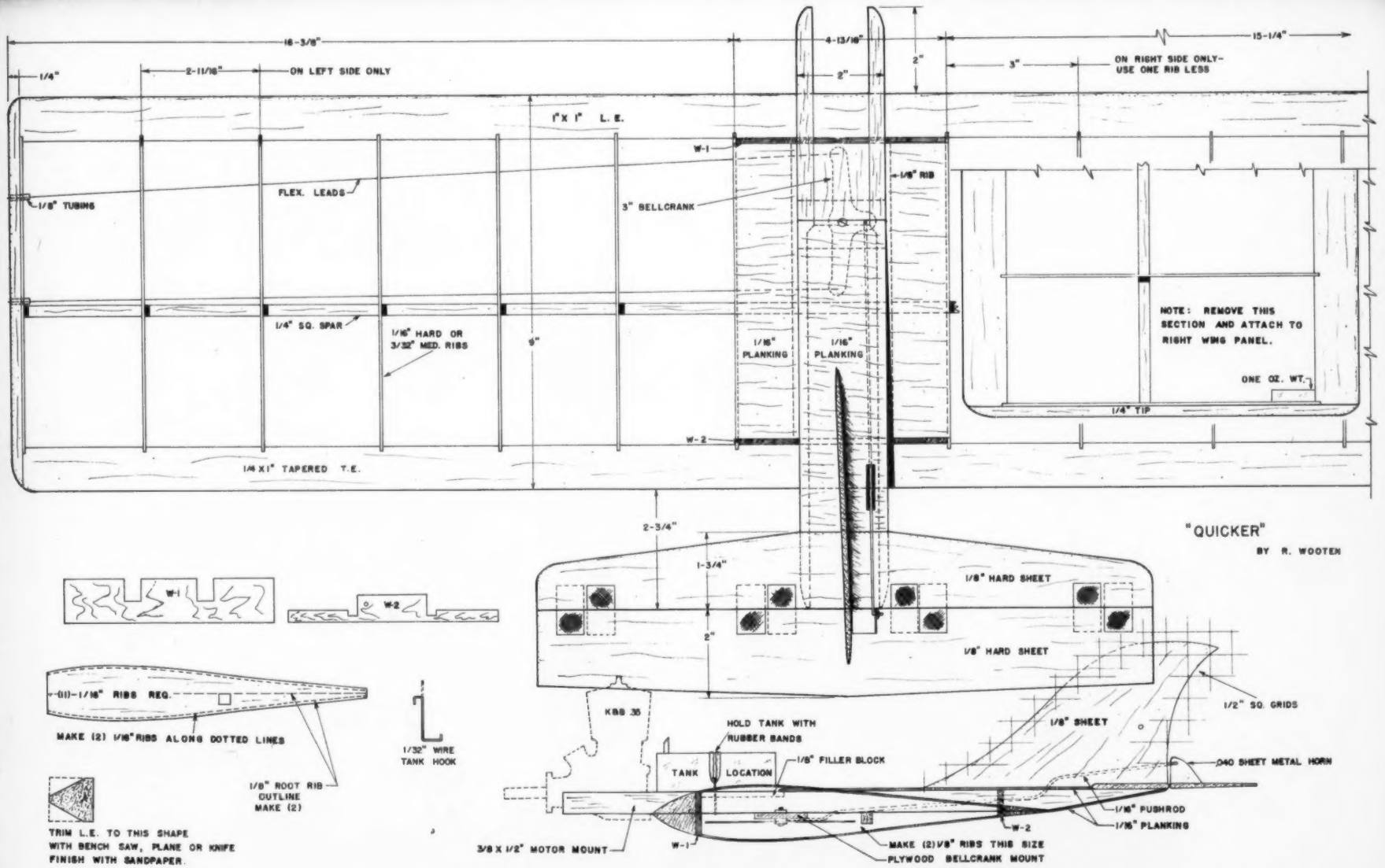
This not (*Continued on page* 44)

Youngsters couldn't resist feeling finish on Hewitt's Berkeley Cub. Citizen-Ship 465 receiver.

SE-5, from MAN, by Howard Payne. Three degrees top, 0 bottom, stab. Six right, 3 down.



Can't beat the multi-bipes for smoothness. Pappy DeBolt readies a modified Cruiser bipe.


18-3/8"
4-13/16"
15-1/4"
1/4"
2-11/16"
ON LEFT SIDE ONLY
2"
3"
ON RIGHT SIDE ONLY-
USE ONE RIB LESS
1"X 1" L.E.
W-1
1/8" TUBING
FLEX. LEADS
3" BELLCRANK
1/8" RIB
1/4" SQ. SPAR
1/16" HARD OR
3/32" MED. RIBS
5"
1/16"
PLANKING
1/16"
PLANKING
NOTE: REMOVE THIS
SECTION AND ATTACH TO
RIGHT WING PANEL.
ONE OZ. WT.
1/4" TIP
W-2
1/4 X1" TAPERED T.E.
2-3/4"
1-3/4"
2"
1/8" HARD SHEET
1/8" HARD SHEET
"QUICKER"
BY R. WOOTEN
W-1
W-2
(11)-1/16" RIBS REQ.
MAKE (2) 1/16" RIBS ALONG DOTTED LINES
1/8" ROOT RIB
OUTLINE
MAKE (2)
1/32" WIRE
TANK HOOK
KBB 35
HOLD TANK WITH
RUBBER BANDS
TANK
LOCATION
1/8" FILLER BLOCK
1/8" SHEET
1/2" SQ. GRIDS
.040 SHEET METAL HORN
1/16" PUSHROD
1/16" PLANKING
W-2
W-1
3/8 X 1/2" MOTOR MOUNT
MAKE (2) 1/8" RIBS THIS SIZE
PLYWOOD BELLCRANK MOUNT
TRIM L.E. TO THIS SHAPE
WITH BENCH SAW, PLANE OR KNIFE
FINISH WITH SANDPAPER.

Nats winning team, a Quicker and the author. Pic by Vanderschel, of Flexibullit fame.

The Quicker

by **RILEY WOOTEN**

Combat king for 1956, cinch to build, this design captured five out of nine firsts at the Nats. Eight men won 36 of 39 elimination flights. Wow!

► The Quicker is the eighth in a series of combat ships designed with a single purpose: bring home the hardware! It wasn't designed to last an entire season or fly through a brick wall; instead it was designed for quick, simple construction and to out perform any plane that it would have to fly against. And that it does!

The plane has a wing area of 324 square inches and an original airfoil, which has a small amount of reverse chamber, or what is generally known as "pollywog," near the trailing edge. I have tried several different airfoils and have had best results with the one shown. The outboard wing also was shortened to give good line tension.

The Quicker was originally designed around the K&B Allyn .35. However both Fox and Johnson engines have been used with very good results. Since both of these engines are lighter, you will have to move them forward on the mounts until the plane balances from ¼" to ½" behind the rear of the leading edge. You may also make the motor mount crutches thinner at the back to help balance the plane with these engines.

When it comes to construction, this plane easily can be built in two evenings by most modelers and much faster by some. The construction is a little unusual so the first plane may take a little longer, but after one you will find that it is very simple and easy to build.

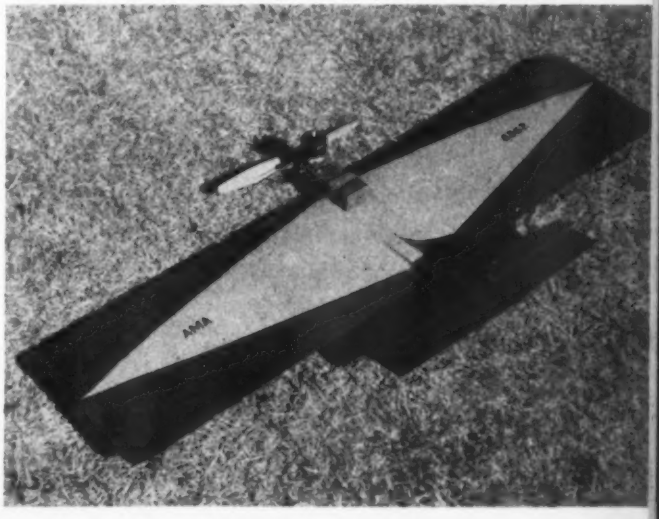
The planes that I have built have weighed from 16 to 19 ounces. The 19-ounce planes were silk covered and proved to be much more rugged. You will find that a well-built Quicker covered with silk will take a lot of punishment, but don't expect too much. No plane is going to survive a vertical crash into asphalt or hard ground when it is traveling at 90 miles per hour or move. I have seen a few planes do it, but these instances are few and far between.

The first Quicker was built in the spring of 1956 and since that time Quicker's have won 11 firsts, eight seconds and three thirds in elimination combat. This record, combined with the plane's quick construction, has made it a favorite with all our friends.

At the 1956 Nationals this plane won five of the top nine places in combat. Of the eight guys who were flying Quickers, we won first and third in open, first and second in senior, and second in junior. Elimination combat was flown and in 39 flights we won 36, while losing only 3 (not counting the times Quicker beat one another).

In local contests, this design has done even better, winning a first in every contest in which they have been entered with the exception of (*Continued on page* 45)

Stable—you can take your eyes off it, the 16- to 20-ounce Quicker can be built in two evenings, one if you're a fast builder.



The Long Project

The engine-on-strut designs were proved in New Zealand. Author and power model, Mark 2.

In Two Parts
Part One

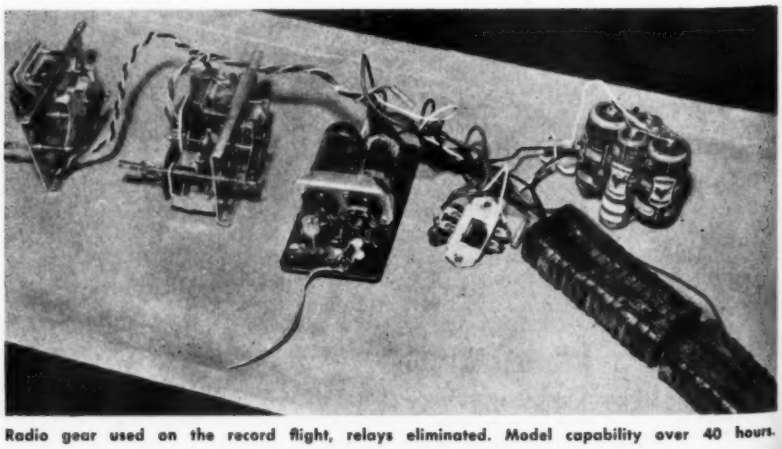
by FRANK BETHWAITE

The man who has accomplished more endurance flights than anyone else in the world tells a fascinating story of experiments and developments, good and bad, taking place over a period of many years. These are the results in designs, glider and power, and in the radio.

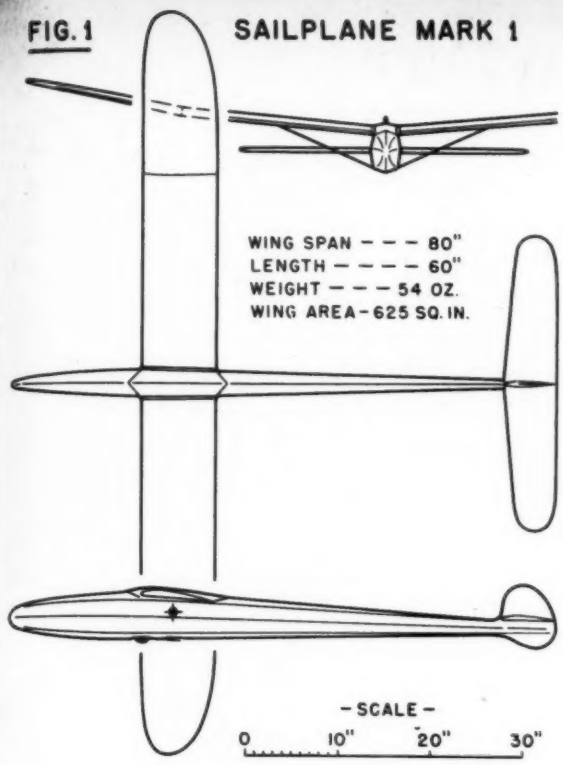
MY long-time friend Les Wright first flew a model under radio control of sorts in 1935. By 1951 he had developed a reliable non-critical system which was immediately adopted and used with every success by the group which had gathered around him. Radio gear that worked every time focussed attention on the model, which until then had been only a test vehicle. With radio problems no longer dominant, the strictly radio members of the group dropped out, and diehard free-flighters, their imaginations stirred by the design challenge and ultimate possibilities of radio control, moved in one by one.

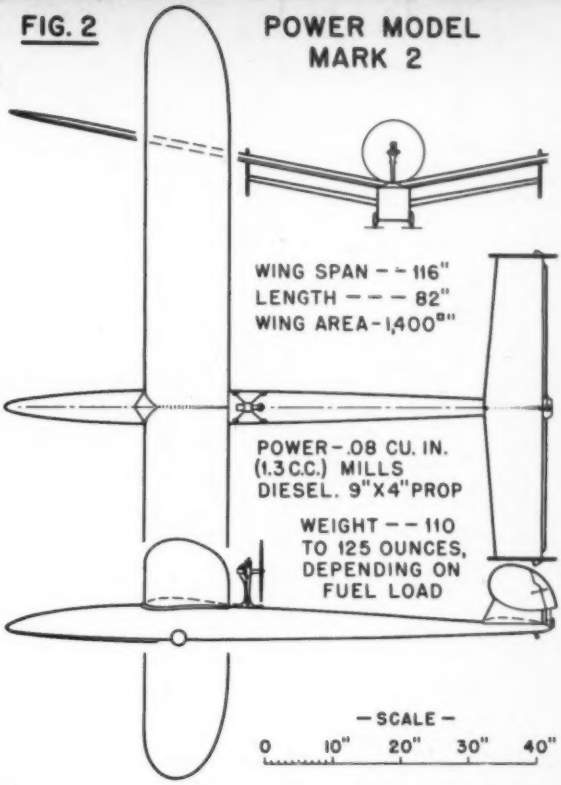
I was one of these late-comers. Les gave me a radio set, and I had perforce to think of something to do with it. The absolute world duration record had always challenged me. Design of the model was not too much of a problem, but it had been idle to dream of keeping a free-flight model in sight, hour after hour in New Zealand's windy climate, unless the timekeeper was carried by aircraft. Cost of a series of attempts would be prohibitive—I never fooled myself by thinking that the first attempt would be successful. Overnight, as it were, radio control offered me a cheap and practical method of keeping the model in sight of the timekeeper, as opposed to keeping the timekeeper in sight of the model. The project was born. Les and I teamed up, he to supply the radios, and I to handle the airframes, with a new and startling purpose behind radio control.

Our plan hinged upon the climate around Auckland. Prevailing wind is Westerly and squally, but in summer steady North-easters often blow. At any season there are a few random near-calm days. Discussion with forecasters and study of meteorological records convinced me that it would often



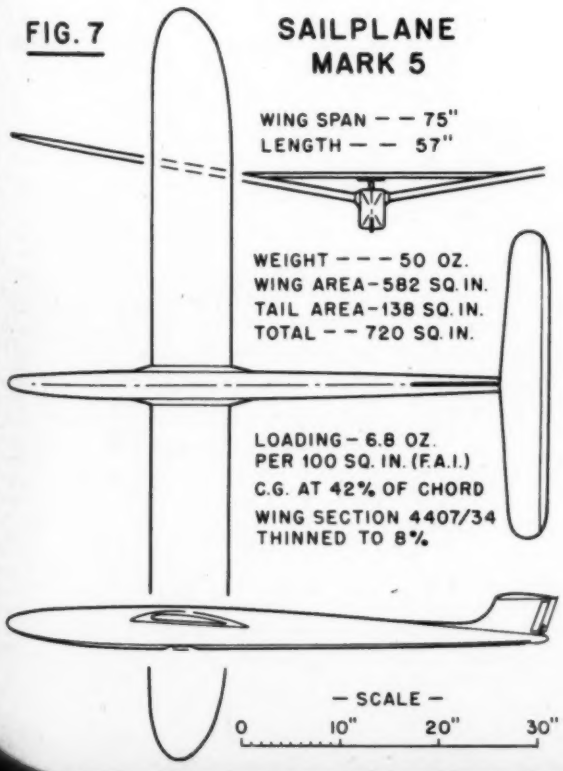
Radio gear used on the record flight, relays eliminated. Model capability over 40 hours.

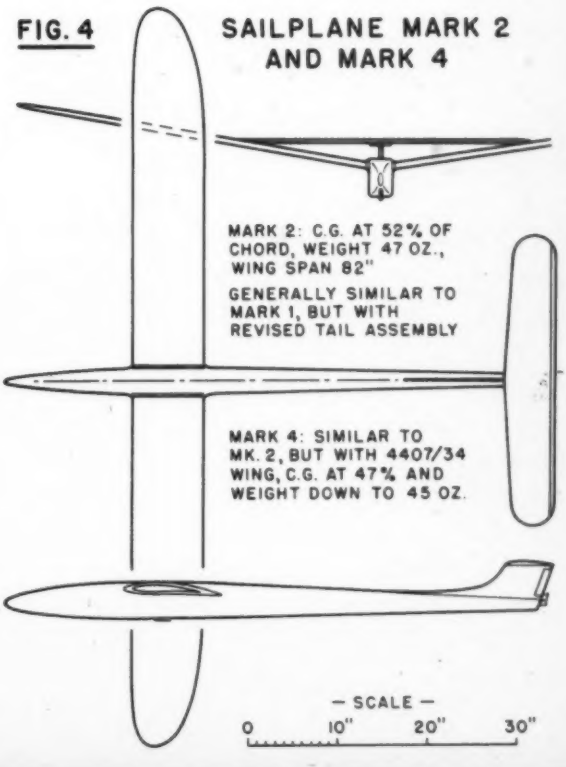


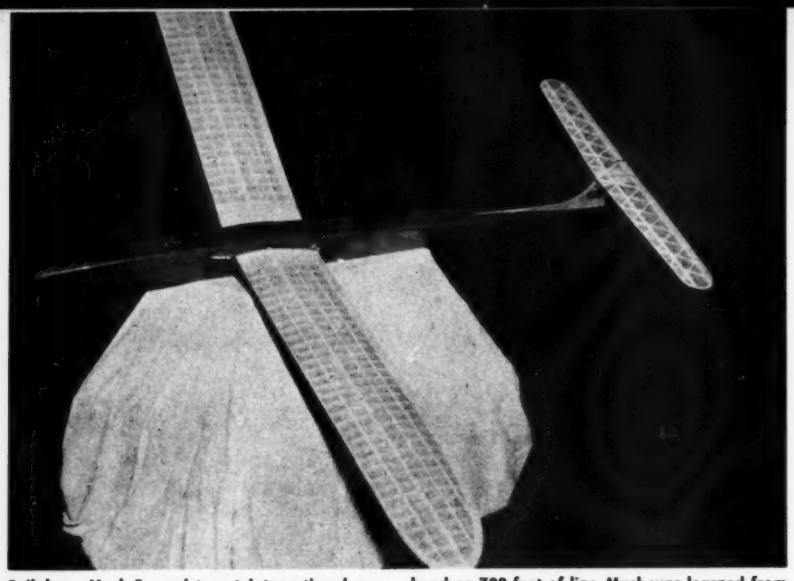


be practical to slope-soar a glider over suitable terrain, and that this technique offered real possibility of long durations. For the rare calm days a power model would obviously be required. Two models were envisaged from the outset; a glider for slope-winds and a flying fuel tank for quieter days.

Les Wright's radio gear is a super-regenerative receiver wired directly to an escapement which we call a relaytor. No sensitive relay is used. A hard valve detector (1R5) is transformer coupled to a hard valve output (3S4). The transformer attenuates all frequencies except the characteristic hiss of the idling super-regenerative receiver. This hiss, rectified, is used to back off the output valve. Hiss disappears on receipt of signal; the output valve then conducts. Filaments use 1.5 volts at 150ma. Plates use 45 volts: approximately I ma runs the detector and another (*Continued on next page*)







Sailplane, Mark 5, used to set International records. On tow-launched flights, ship went overhead on 700 feet of line. Much was learned from a study of sea gulls in flight, cloud formations.

Two tin cans soldered end to end made up a pressurized tank for Mills. Span nearly 10 ft.

The Long Project —continued

¼ma "leaks" through the output stage to the relaytor with idling rising to about 9ma on receipt of signal. This current change from ¼ to 9ma at 45 volts has proved enough to operate a well-made escapement direct; several models have thus been flown. But the standard relaytor is an escapement mechanism fitted with a trigger arm so that friction loads on the armature are reduced to one-fifth of the direct load. Operation is left-center-right-center with turn held as long as the key is depressed.

The transmitter radiates on 35.7 mcs. Power, at 0.8 watt, appears trivial compared with contemporary overseas practice, but control is certain up to extreme visual range at least.

The two-control system developed for use in later models employs a rudder relaytor modified so that it will perform its normal function and, in addition, will operate a second relaytor when desired. The principle is to arrange two series contacts such that they will both be closed only if a very short pulse is transmitted; at all other times one or the other is open. In practice, all normal control of the model is deliberate; the key is held depressed for a minimum of about one-quarter second even when throwing away an unwanted turn, and a definite snap action is necessary to select the second control. The method is to slow down the rudder relaytor drive-shaft with a Bonner-type rattler, and to fit the two series contacts, one as the "up"stop of the armature, and the other a wiping contact set to make and break slightly before the "turn" position of the drive-shaft is reached. During all normal deliberate operation, the armature is always down and the first contact open as the drive-shaft moves 90 degrees from neutral to turn, thus the wiping contact does not complete any circuit. But, if at any time a pulse is transmitted short enough to pull the armature down and let it up again before the drive-shaft has rotated past the wiping contact, then the two series contacts are both closed momentarily and current flows briefly to operate the second relaytor. No extra batteries are needed and no modification to the transmitter is required. We call this system "quick-snap"; it has proved absolutely practical and reliable. Perhaps its greatest virtue is that its nature of operation is such that confusion in the mind of the operator does not occur.

The practical virtue of this gear is its mechanical simplicity and ruggedness, its freedom from requiring critical electrical adjustments, and its tolerance to voltage variation. Installed in the model and tuned, it will operate over a filament voltage range from 1.6 to 1.1 volts, and an HT range from 45 to 32 volts. Although lightweight batteries are used in small models, it is customary for large models to carry HT batteries of 8 ozs. weight which generally last six months or more. Filament supply is usually one 3 oz. cell. Receiver and case weigh 3 ozs., the relaytor 2½ ozs.; total installed weight is normally 16 ozs.; plus another relaytor for two controls.

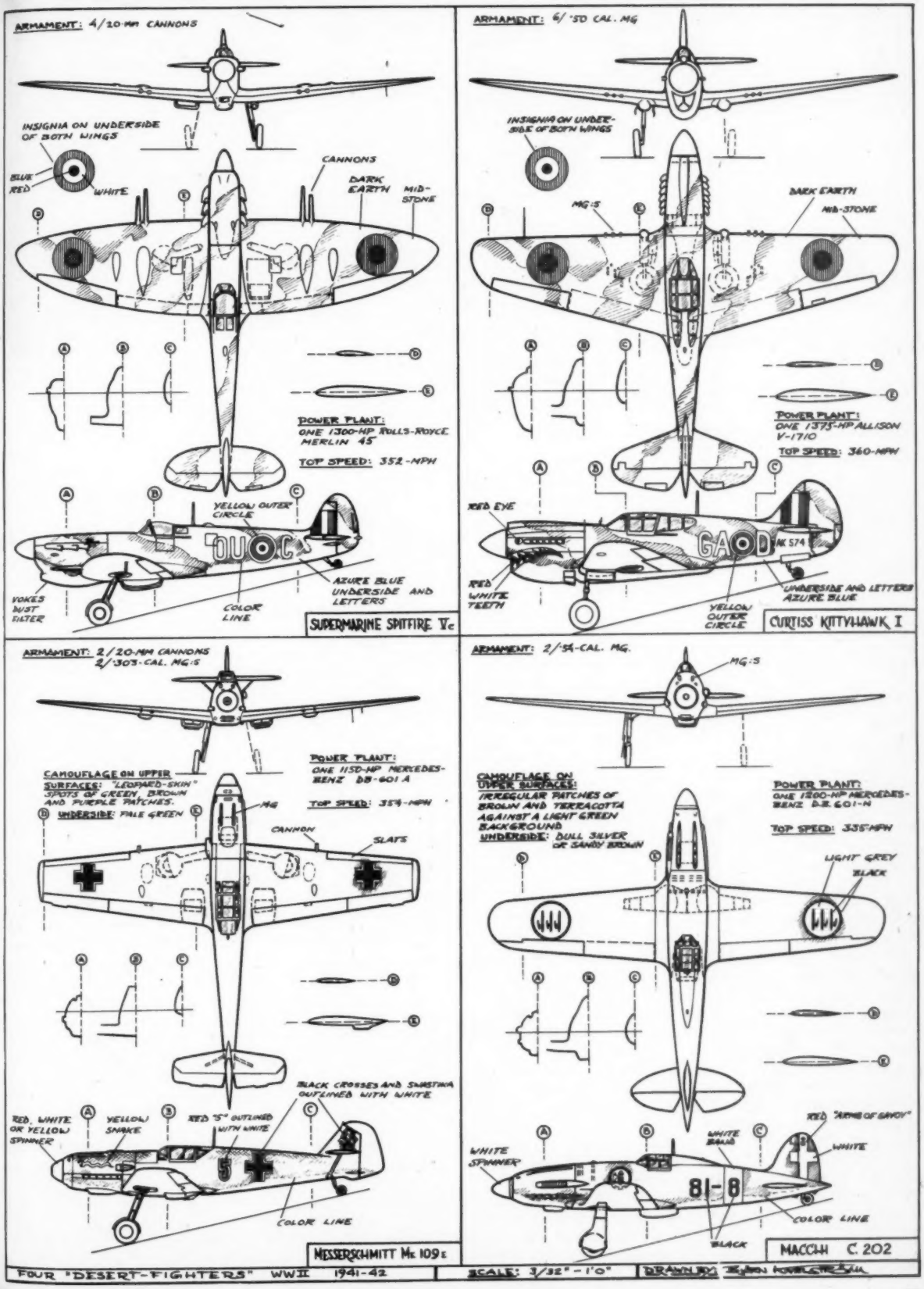
The first glider (Mark 1) was designed to carry 16 ozs. of gear, to fly at 30 feet per second or more, to be big enough to be seen at range, and to be really tough. Following closely the proportions of a highly developed A2 glider, it came out at 80" span, 60" long, 625 sq. ins. area with a 13% thick flat-bottom section, 80" of ¼ x 1/24 rubber, which I wound 30 turns per inch (50% breaking) to 2,400 max. A 3 oz. Venner 5-amp/hr. accumulator stored a potential 20 hour's filament supply.

It still amazes me to recall its first flight. One warm day in Sept. '52 we took the model to an inland valley up one side of which a gusty wind was blowing. Once trimmed, it soared up and away from a hand launch, flying easily and cleanly at several hundred feet, and control proved so docile that I let a bystander fly it for several minutes. After nearly half an hour the model was deliberately flown into the downdraught over the windward side of the valley, and I went home thinking how easy was this technique.

It was several months before I made the next successful flight, and about two years before I found out why that first flight had been successful.

That glider was taken out, in the weeks that followed, on every possible occasion, first to this slope and then to that. Gradually I learned that a slope is not enough—a very abrupt rise is required. I saw that unless the model is launched and can be held *above* the level of the crest it will probably never rise at all. (This makes hand launching critical at all times.) I found that the area of lift near the crest of a slope is very small indeed, and is so close alongside the crest that the slightest control error is disastrous. I learned that lift could be expected from a warm wind, and that little lift could be expected from even a strong cold wind. I discovered the fearful turbulence that exists near the ground behind the crest, and even in front of it unless the wind comes clean to the slope—for this reason I now reject all slopes other than those facing the open sea. The model meantime took a fearful beating, be- (*Continued on page* 51)

Friend and Foe—FOUR DESERT FIGHTERS OF WW 2



Airnocker

by WALT MOONEY

On land or sea this flying scale model for .049 power is as real as real can be. Hundreds of successful hops.

Take-offs from the water are snappy and landings are beautiful to behold. Let's get going!

► Why make the Champion? To come right to the point, the following reasons explain why the Aeronca Champion makes a perfect flying scale model.

The full-sized airplane is very easy to fly and, I guess, every pilot likes to build a model of a plane that he has flown. The "Airnocker" is common enough so that details are easy to study first hand. It is fabric covered so that true scale appearance with a light flying weight is easily obtainable. It has the right aerodynamic setup to make a fine flying-scale model. That characteristic orange-bellied color scheme is impossible to mistake for a Cub. Convinced?

The original model shown in the photographs is over two years old. It has been flown in two contests, taking second in a field of 16 in San Diego, and seventh at the last California Nationals. It has also been flown as a sport ship several hundred times with and without floats. On wheels, it glides flat and climbs steeply, typical flight times being 2:33 on a :35 engine run and 3:30 on a :49 engine run. With floats, take-offs are snappy and the landings are real pretty. Water take-offs work best in calm weather and with maximum power.

The model is exact scale with two exceptions: these are increased dihedral and a slightly enlarged horizontal tail. People familiar with the free-blown bulgy windshield on some of the real Champions will complain about the one on the model, but the windshield shown is scale for some Champions (not all of them had the real bulgy windshield) and is much easier to model. The floats are definitely not scale floats but they are semi-scale and have the right relative size. They were designed to work well on a model.

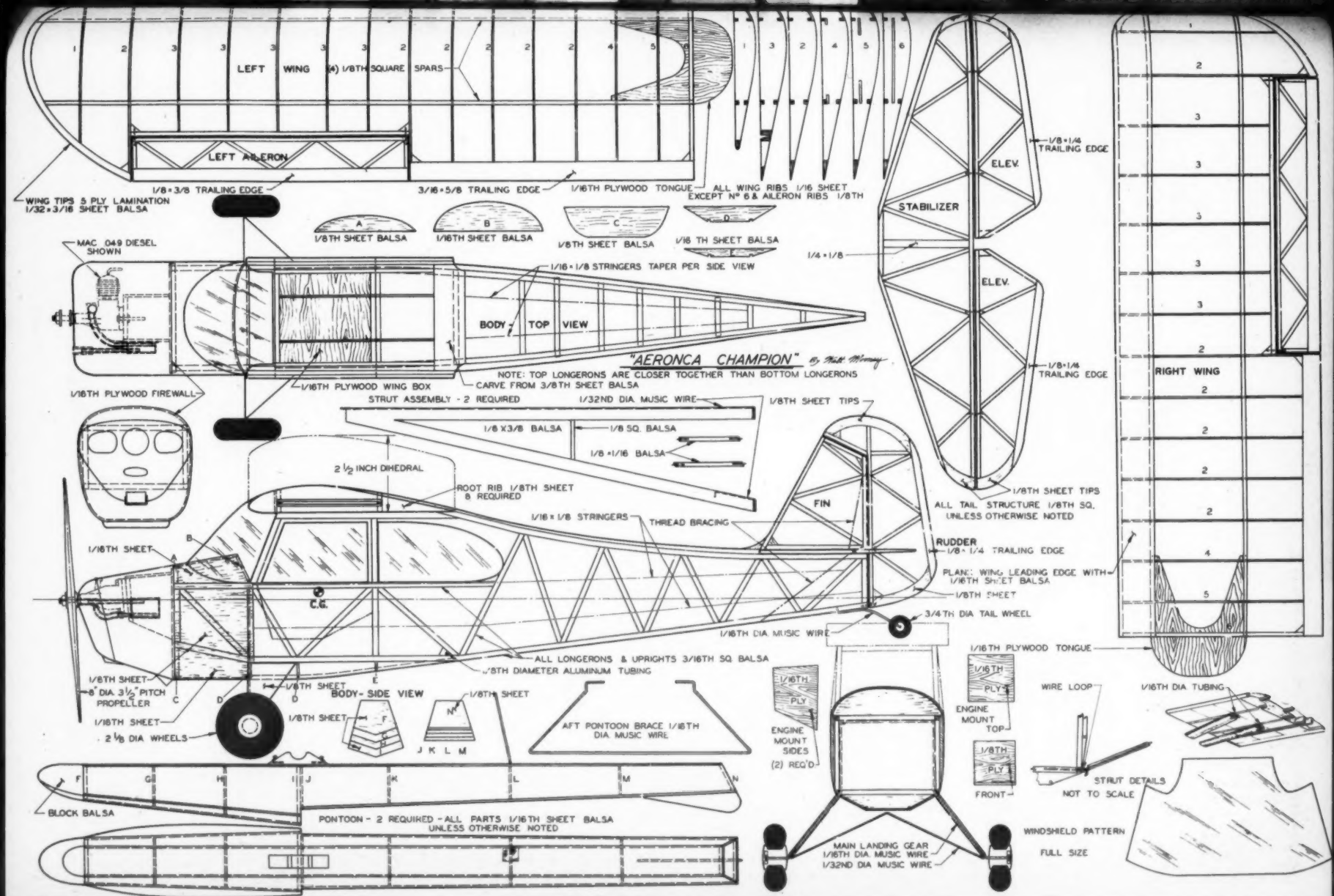
CONSTRUCTION

The wings of the Aeronca Champion model have the scale number of ribs and, in general, scale structure. They are relatively straight forward as far as construction goes. Care must be taken when cutting out the slots in the three inboard ribs for the plywood wing tongues, in order to give exactly the same incidence angle in each wing. The wing tips are laminated from five plys of 1/32 x 3/16 balsa. A form block is cut from boxwood scrap to the inside contour of the tip, then the balsa plies are coated with cement and formed around the block. When dry, this gives a very strong tip bow which is nearer (*Continued on* page 48)

Don't forget to fasten the safety belt. Increased dihedral, slightly enlarged horizontal tail are the only departures from scale.

Floats and land gear are quickly interchangeable. Floats are not scale, but are semi-scale and are the proper size. They do work!

Wing panels knock-off—tongues slide into center-section boxes. Rubber bands looped over wheel hubs give quick float attachment.



FULL SIZE PLANS AVAILABLE. SEE PAGE 56.

MORE..about Stunt Theory

This is tough going but digging diamonds also is tough. If the long-haired stuff is too deep, the recap at end will prove worth studying.

by W. F. NETZEBAND, JR.

Corsair, left, a Sterling kit with Fox .59 and proportionate throttle operated from a Roberts Flight Control System. Top 90, low 25. Sea Dart, right, bit of mystery but sports a spinner.

In keeping with the style five years ago, this author's original used a thick wing section, won a few meets, but not exceptional.

But an 18% section on this Palmer design gave good pattern at a 60 mph speed, squared well. Span was 52 in. and flaps utilized.

► Flaps are a must for the modern stunt ship for several reasons. They increase the lift when it is most needed, by copious amounts. They allow us to use thinner airfoils for level flight, which cuts down the possibility of hunting, and decrease the sensitivity to lift changes caused by wind. One detrimental affect is causing the center of pressure to move aft when they are depressed, resulting in nose heavy trim. This is corrected by using larger, more effective elevator action as we will discuss later. As for size and shape, size depends on wing chord. The author prefers to start with a wing area and add the flaps to it. The chord of the flap is: C1 = .20C, where C is wing chord. Flaps for our wing would be 1.8 inches wide.

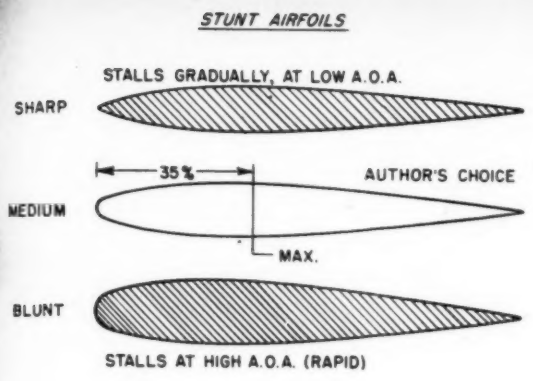
It has not proved best to run flaps full span, since they cause excessive wobbling laterally due to burble and increased lift at the wing tips. Therefore, flaps should taper in width from root to tip or simply not run full span. Amount of taper is arbitrary. A criterion for smooth flying is to have the wing tips stall last. With flaps, an airfoil stalls at lower angles of attack than without; around 8 degrees compared to 10 degrees with a 12% thick section. By reducing the flap size, and hence the effect toward the tip, we accomplish this aim.

It should be apparent that the closer to the fuselage we develop our center of lift, the lighter we can build our wing and we are less apt to have tip wobble. Tapered flaps, tapered or elliptical wings and other tricks are used for this. Maximum deflection should be 30 degrees and can be as little as 10 degrees. These depend on several factors which will be brought out gradually. Total area of flaps compared to wing area should be less than 20% with most of the area concentrated in the center portions of the span. Distribution of area hasn't appeared to need mathematics yet. Too many variables are involved.

In order to compare characteristics, total weight is usually treated as weight per unit area for the wing. This enables us to use data gained in tests. Simply stated, a heavy airplane with a large wing will turn the same as a light airplane with a small wing, if their wing loadings are equal. Through experiment and experience the following are considered the best range of wing loadings for flapped wings and normal wings: with flaps—.05 to .10 oz./sq. in.; without flaps—.05 to .07 oz./sq. in.

The .10 oz./sq.in. would give a 50-ounce airplane for 500 sq.in. Lower figure is a minimum practical limit. Some have exceeded this with feather-weight combat ships, but not many.

For the present we are ignoring the flying wing for



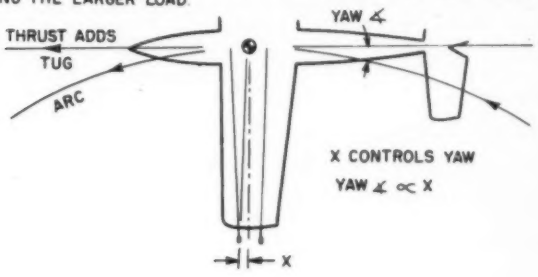
stunt use. Harold Reinhardt is the only one, to our knowledge, who has won a big meet in stunt with a wing. Mr. Reinhardt is also a superb flier. We are studying the possibilities of this shape, but are not far enough along to make firm decisions. So, the stabilizer is still required. For those who are in doubt as to why the stabilizer, it does what its name implies. Stabilizes the wing. Through the elevator it controls the wing's angle of attack, hence controlling the flight attitude of the airplane. We balance the airplane ahead of the center of lift and bring the system to equilibrium by causing the stabilizer to generate a down load. See Figure 3. Most symmetrical airfoils lift at the 25% location as previously mentioned. Therefore, always locate the CG forward of this point. When we want to climb we give "up" elevator which increases the down lift of the stab. The wing then starts to balance this change. It begins to increase its angle of attack until it balances the stabilizer load. In doing this, it generates more lift so the airplane seeks an attitude to balance the increased lift. Our model moves in a circle which we call the loop.

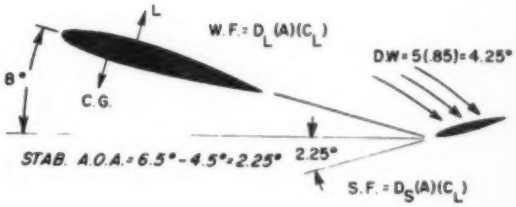
In the formula consider, for the moment, D_s as fixed. If we decrease D_1; ei, move the CG aft, it will take less force from the stab to produce a given change in lift. As we move the CG forward it takes a larger change in force to change L. This is the secret of sensitive and coarse control. The other method is to increase or decrease elevator area or motion. By placing our CG at 10%, or forward, we get coarse control or large motions of elevator are necessary to cause changes of attitude. If we balanced right on the 25% line we would find a very sensitive ship since, theoretically, zero force would move the wing. If we move the CG aft of the 25% line we must have positive force, or "down" elevator to control the wing. Free flighters are familiar with this through the use of lifting stabs.

This condition fouls up the control-line ship for two reasons. First, any time we get a down load on the stab our ship would climb violently, in fact uncontrollably. Correction results in over correction and usually a splat. Second reason on stunt ships is the very low AOA in level flight. With aft CG, our stab is now lifting so wing lift must decrease or we'll climb. So we approach our zero lift angle and generally pass it, causing a quick dive since our system suddenly becomes way unbalanced. Again correction causes overcontrolling and same end result. We tried this experimentally using a lifting stab on a team-race design. It proved to be flyable, but not too controllable, since it wandered up and down on it's own. This balance condition occurs in far too many cases of stunt and scale models. You recognize any of your ships here?

By moving the whole stabilizer we can predict the area necessary quite accurately, since it will operate as a wing. One thing which occurs as the wing's AOA is increased is a change in the angle (*Continued on page* 54)

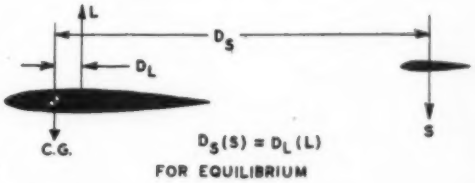
C.G. WILL ALIGN IT SELF ALONG THE LINE OF RESTRAINING FORCE. THIS DOES NOT DEPEND ON THE BELLCRANK LOCATION. BELLCRANK SHOULD BE ON C.G. FOR LEAST RESISTANCE TO MOTION. NOTE THAT LINES WILL FORM AN ARC DUE TO THIER DRAG WHICH WILL MAKE ACTUAL YAW ANGLE LESS THAN IF LINES WERE TAUT. THE REFERENCE POINT AT THE TIP MOVES TOWARD THE LINE CARRYING THE LARGER LOAD.

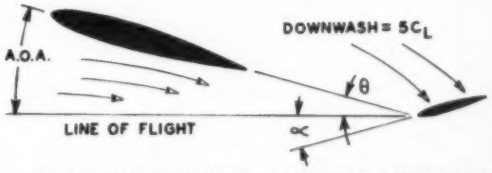




ANGULAR DIFFERENCE BETWEEN WING & STAB. = 8° + 2.25° = 10.25° NECESSARY MOMENT ON PLANE

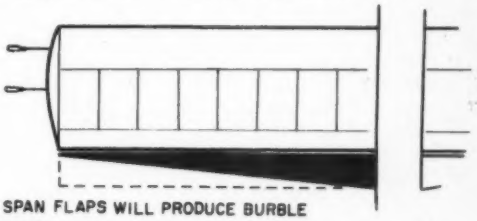
C.G. @ 20%	W.F. = .45(432)(.85) = 165	8.73A = 165
	S.F. = 16(.6)A = 8.73A	A = 19 in.^{2}
C.G. @ 10%	W.F. = 1.3(432)(.85) = 495	10.1A = 495
	S.F. = 16.9(.6)A = 10.1A	A = 49 in.^{2}





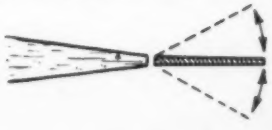
RELATIVE AIR NOT SAME AS FOR WING EFFECTIVE A.O.A. NOW ∝ + θ. TRY D.W. OF 6C_L FOR FLAPS.

TOTAL AREA OF FLAPS SHOULD BE LESS THAN 20% MOST AREA CONCENTRATED AT CENTER OF SPAN....



FULL SPAN FLAPS WILL PRODUCE BURBLE IN AIR FLOW.

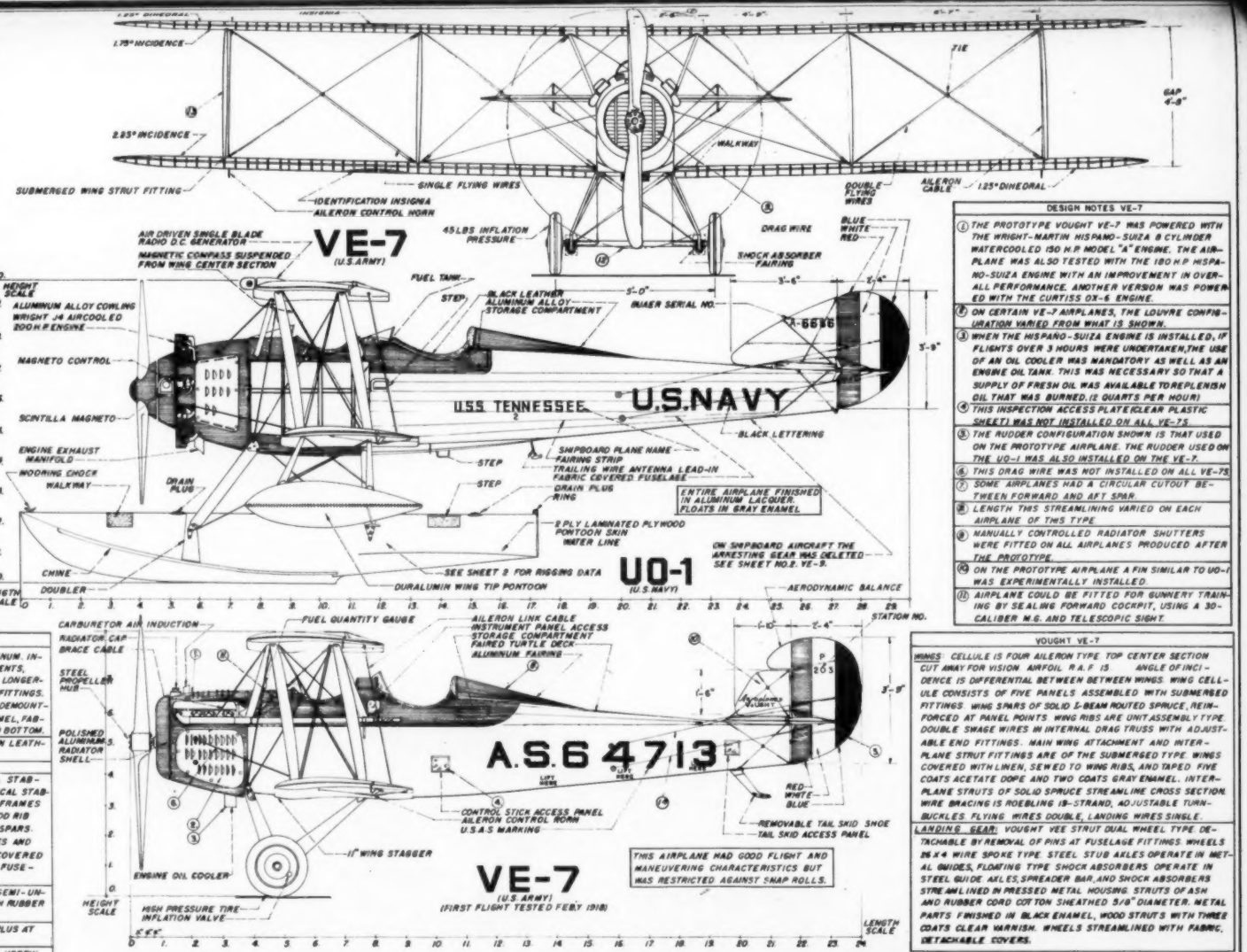
MAXIMUM FLAP MOVEMENT 30°



CHANCE VOUGHT VE-7, VE-9, UO-1—ARMY, NAVY TYPES.

(SHEET NO. 2)

CHANCE VOUGHT VE-7&UO-1



VOUGHT VE-7

ENGINE INSTALLATION: WRIGHT-MARTIN HISPANO-SUIZA MODEL "A" 150 H.P. WATERCOOLED ENGINE.

PROPELLER: LIBERTY, 2-BLADE, 8'-4" DIAMETER OF LAMINATED WALNUT PITCH 5'-5½".

ENGINE EXHAUST MANIFOLD: TUBULAR WELDED SHEET SUPPORTED ON FORGED BRACKETS.

ENGINE STARTING: PILOT'S COCKPIT PROVIDED WITH BOOSTER MAGNETO AND LUNKENHEIMER FUEL PRIMER. ENGINE WAS HAND CRANKED.

ENGINE CONTROLS: EACH COCKPIT PROVIDED WITH THROTTLE, SPARK, AND FUEL MIXTURE LEVERS ON LEFT SIDE.

ENGINE RADIATOR: HONEYCOMB TYPE, 9½ GALLONS WATER SYSTEM CIRCULATION CAPACITY. DISTANCE TYPE TEMPERATURE INDICATOR. SHUTTERS MANUALLY CONTROLLABLE.

FUEL SYSTEM: TWO FUEL TANKS, MAIN UNDER REAR SEAT, AUXILIARY UNDER COWL BETWEEN ENGINE AND INSTRUMENT PANEL. FUEL CAPACITY 38 GALLONS. FUEL PUMPED TO CARBURETOR BY AN ENGINE-DRIVEN FUEL PUMP. HAND AIR PUMP FOR STARTING IN PILOT'S COCKPIT. FUEL SHUT-OFF VALVES IN EACH COCKPIT.

FLIGHT CONTROLS: DUAL JOYSTICKS AND RUDDER BARS IN EACH COCKPIT. CONTROLS ASSEMBLED AS A UNIT AND QUICKLY REMOVABLE.

INSTRUMENTS: CONSIST OF ALTIMETER, AIRSPEED INDICATOR, CLOCK, TACHOMETER, FUEL PRESSURE GAUGE, OIL PRESSURE GAUGE, WATER TEMPERATURE GAUGE, ETC.

DESIGN NOTES VE-7

(12) VARIOUS MAKES AND TYPES OF LAMINATED PROPELLERS WERE USED WITH VARIATIONS IN PITCH.

(13) INTERPLANE STRUTS OF CONSTANT OR VARIED STREAMLINE CROSS SECTION WERE USED.

(14) ENTIRE FLIGHT CONTROLS ARE CABLE ACTUATED. ALL CABLES ARE DOUBLE, FLEXIBLE TYPE.

THE AMERICAN VERSION OF THE HISPANO-SUIZA ENGINE WAS MANUFACTURED UNDER FOREIGN LICENSE BY THE SIMPLEX AUTOMOBILE COMPANY. THIS COMPANY WAS LATER ABSORBED BY THE WRIGHT-MARTIN AIRCRAFT COMPANY OF NEW BRUNSWICK, N.J., THE PARENT COMPANY OF THE PRESENT CURTISS-WRIGHT CORPORATION.

DESIGN NOTES VE-7

(1) THE PROTOTYPE VOUGHT VE-7 WAS POWERED WITH THE WRIGHT-MARTIN HISPANO-SUIZA 8 CYLINDER WATERCOOLED 150 H.P. MODEL "A" ENGINE. THE AIRPLANE WAS ALSO TESTED WITH THE 180 H.P. HISPANO-SUIZA ENGINE WITH AN IMPROVEMENT IN OVERALL PERFORMANCE. ANOTHER VERSION WAS POWERED WITH THE CURTISS OX-6 ENGINE.

(2) ON CERTAIN VE-7 AIRPLANES, THE LOUVRE CONFIGURATION VARIED FROM WHAT IS SHOWN.

(3) WHEN THE HISPANO-SUIZA ENGINE IS INSTALLED, IF FLIGHTS OVER 3 HOURS WERE UNDERTAKEN, THE USE OF AN OIL COOLER WAS MANDATORY AS WELL AS AN ENGINE OIL TANK. THIS WAS NECESSARY SO THAT A SUPPLY OF FRESH OIL WAS AVAILABLE TO REPLENISH OIL THAT WAS BURNED. (2 QUARTS PER HOUR)

(4) THIS INSPECTION ACCESS PLATE (CLEAR PLASTIC SHEET) WAS NOT INSTALLED ON ALL VE-7'S.

(5) THE RUDDER CONFIGURATION SHOWN IS THAT USED ON THE PROTOTYPE AIRPLANE. THE RUDDER USED ON THE UO-1 WAS ALSO INSTALLED ON THE VE-7.

(6) THIS DRAG WIRE WAS NOT INSTALLED ON ALL VE-7'S.

(7) SOME AIRPLANES HAD A CIRCULAR CUTOUT BETWEEN FORWARD AND AFT SPAR.

(8) LENGTH THIS STREAMLINING VARIED ON EACH AIRPLANE OF THIS TYPE.

(9) MANUALLY CONTROLLED RADIATOR SHUTTERS WERE FITTED ON ALL AIRPLANES PRODUCED AFTER THE PROTOTYPE.

(10) ON THE PROTOTYPE AIRPLANE A FIN SIMILAR TO UO-1 WAS EXPERIMENTALLY INSTALLED.

(11) AIRPLANE COULD BE FITTED FOR GUNNERY TRAINING BY SEALING FORWARD COCKPIT, USING A 30-CALIBER M.G. AND TELESCOPIC SIGHT.

VOUGHT VE-7

FUSELAGE: ENGINE COWLS ARE PRESSED SHEET ALUMINUM. INSPECTION PLATES PROVIDED FOR ACCESS TO INSTRUMENTS, FLIGHT CONTROLS AND TAIL SKID. FRAME HAS SPRUCE LONGERONS AND STRUTS, STEEL CABLE BRACING, AND STEEL FITTINGS. RECTANGULAR CROSS SECTION. ENGINE SECTION IS DEMOUNTABLE AS A UNIT. ENGINE COWLING'S LIGHT BLUE ENAMEL, FABRIC GRAY ENAMEL. FUSELAGE TRUSS FAIRED TOP AND BOTTOM.

SEATING: EACH COCKPIT UPHOLSTERED WITH IMITATION LEATHER. PLYWOOD SEATS. LEATHER COCKPIT COAMING.

WINDSHIELDS: CLEAR REINFORCED PLASTIC SHEET.

EMPENNAGE: FIXED DOUBLE CAMBERED HORIZONTAL STABILIZER. ELEVATORS DUAL CONNECTED. FIXED VERTICAL STABILIZER. AERODYNAMICALLY BALANCED RUDDER. ALL FRAMES OF STEEL TUBES WELDED OR BRAZED TOGETHER, WOOD RIB FILLED OVER TUBULAR STEEL AND ROUTED SPRUCE SPARS. STRUCTURE INTERNALLY BRACED WITH SWAGED CABLES AND ADJUSTABLE STEEL FITTINGS. ENTIRE EMPENNAGE COVERED WITH APPROVED COTTON FABRIC, FINISHED TO MATCH FUSELAGE COVERING.

TAIL SKID: PATENTED VOUGHT DESIGN, FLOATING TYPE, SEMI-UNIVERSAL AND SELF-ALIGNING IN ACTION. FITTED WITH RUBBER SHOCK ABSORBERS AND RENEWABLE METAL SHOE.

FACTOR OF SAFETY: UNIFORM FACTOR OF SAFETY OF 9 PLUS AT HIGH INCIDENCE CONDITION IN STATIC TESTS.

WEIGHT (GROSS): 2,000 POUNDS INCLUDING 525 POUNDS USEFUL LOAD AND 78 POUNDS ENGINE COOLING WATER.

THIS AIRPLANE HAD GOOD FLIGHT AND MANEUVERING CHARACTERISTICS BUT WAS RESTRICTED AGAINST SNAP ROLLS.

VOUGHT VE-7

WINGS: CELLULE IS FOUR AILERON TYPE. TOP CENTER SECTION CUT AWAY FOR VISION. AIRFOIL R.A.F. 15. ANGLE OF INCIDENCE IS DIFFERENTIAL BETWEEN BETWEEN WINGS. WING CELLULE CONSISTS OF FIVE PANELS ASSEMBLED WITH SUBMERGED FITTINGS. WING SPARS OF SOLID I-BEAM ROUTED SPRUCE, REINFORCED AT PANEL POINTS. WING RIBS ARE UNIT ASSEMBLY TYPE. DOUBLE SWAGE WIRES IN INTERNAL DRAG TRUSS WITH ADJUSTABLE END FITTINGS. MAIN WING ATTACHMENT AND INTERPLANE STRUT FITTINGS ARE OF THE SUBMERGED TYPE. WINGS COVERED WITH LINEN, SEWED TO WING RIBS, AND TAPED. FIVE COATS ACETATE DOPE AND TWO COATS GRAY ENAMEL. INTERPLANE STRUTS OF SOLID SPRUCE STREAMLINE CROSS SECTION. WIRE BRACING IS ROEBLING 19-STRAND, ADJUSTABLE TURNBUCKLES. FLYING WIRES DOUBLE, LANDING WIRES SINGLE.

LANDING GEAR: VOUGHT VEE STRUT DUAL WHEEL TYPE DETACHABLE BY REMOVAL OF PINS AT FUSELAGE FITTINGS. WHEELS 26 x 4 WIRE SPOKE TYPE. STEEL STUB AXLES OPERATE IN METAL GUIDES, FLOATING TYPE SHOCK ABSORBERS OPERATE IN STEEL GUIDE AXLES, SPREADER BAR, AND SHOCK ABSORBERS STREAMLINED IN PRESSED METAL HOUSING. STRUTS OF ASH AND RUBBER CORD COTTON SHEATHED 5/8" DIAMETER. METAL PARTS FINISHED IN BLACK ENAMEL, WOOD STRUTS WITH THREE COATS CLEAR VARNISH. WHEELS STREAMLINED WITH FABRIC DETACHABLE COVERS.

(SHEET NO. 1)

(DRAWN FOR MODEL AIRPLANE NEWS BY WILLIS L. NYE)

THESE TWO PLATES BEGIN THE TWO-PART DESIGN STUDY.

VOUGHT VE-7

THE CHANCE VOUGHT VE-7 WAS DESIGNED AS AN ENTRANT IN THE U.S.ARMY ADVANCED TRAINER COMPETITION HELD IN 1917. THE FIRST EXPERIMENTAL AIRPLANE WAS SUBMITTED FOR TESTING BY ARMY AUTHORITIES IN 1918. THE VE-7 WON THE COMPETITION AND WAS ORDERED INTO PRODUCTION BY THE PARENT COMPANY AND TWO LICENSEES, THE SPRINGFIELD AIRCRAFT CO. AND THE B.F.STURTEVANT COMPANY. TWENTY VE-7 PLANES WERE DELIVERED BY THE END OF WORLD WAR I. IN 1922-23 YEARS 27 VE-9 AIRPLANES WERE PROCURED BY THE U.S.ARMY AIR SERVICE.

THE AIRPLANE WAS FINISHED IN SILVER PIGMENTED LACQUER. SHADED AREAS GRAY. ENGINE AND TIRES IN BLACK.

NAVY VOUGHT VE-9

THIS AIRPLANE WAS AN IMPROVED VERSION OF THE VE-7 MODEL BUILT FOR THE U.S.ARMY. THE VE-9 WAS ADAPTED FOR LAND OR WATER OPERATION. THE VE-9 WAS THE FIRST AMERICAN DESIGNED SHIPBOARD AIRPLANE THAT COULD BE LAUNCHED FROM A CATAPAULT. THE FUSELAGE WAS STRENGTHENED FOR ROUGH WATER LANDING AS WELL AS THE IMPACT OF CATAPAULT LAUNCHING. TWO AIRPLANES OF THIS TYPE WERE ASSIGNED TO EACH BATTLESHIP FOR SCOUTING AND GUNFIRE SPOTTING.

- ENGINE INSTALLATION: WATER COOLED, AEROMARINE MANUFACTURE, 150 H.P. MODEL U-873.
- FUSELAGE: STRENGTHENED SPRUCE LONGERONS AND STRUTS AND STEEL CABLES AND FITTINGS.
- SEATING: SAME AS VE-7.
- WINDSHIELDS: SAME AS VE-7.
- EMPENNAGE: SAME AS VE-7, EXCEPT INCREASED VERTICAL STABILIZER AREA.
- FACTOR OF SAFETY: SAME AS VE-7.
- WEIGHT: IN EXCESS OF VE-7.
- WING CELLULE: IDENTICAL TO VE-7. CENTER SECTION OF UPPER WING REINFORCED FOR HOISTING PURPOSES.
- FLIGHT CONTROLS: SAME AS VE-7.
- FUEL SYSTEM: IMPROVED OVER VE-7.

DESIGN NOTES VOUGHT VE-9

1. AEROMARINE TYPE ENGINE VEE CYLINDER BLOCK WAS NOT SUCCESSFUL AS AN ENGINE TYPE.
2. PROPELLER 8'-4" DIAMETER LAMINATED TYPE.
3. WING TIP FLOAT TYPE USED ALSO ON EARLY MODELS OF UO-1. (ALUMINUM ALLOY STRUCTURE)
4. FIN INCREASED IN AREA AS REQUIRED WHEN PONTOONS ARE INSTALLED (ADJUSTABLE SETTING)
5. PONTOON CONSISTS OF SPRUCE FRAMES AND LONGITUDINAL MEMBERS AND LAMINATED MAHOGANY PLYWOOD (3 LAYERS) AT 90° DIRECTION OF GRAIN TO EACH OTHER.
6. WIND-DRIVEN GENERATOR FOR RADIO TRANSMITTER WITH LOW AND HIGH VOLTAGE OUTPUT.
7. ARRESTING HOOK OMITTED ON SEAPLANES.
8. THIS BRACE CABLE USED ON VE-9 ONLY, AND EARLY PRODUCTION UO-1 AIRPLANES.
9. THIS BRACE CABLE USED ON VE-9 SEAPLANES ONLY.
10. THIS TYPE OF FLOAT STERN USED ON VE-9 SEAPLANES ONLY.
11. STREAMLINE SPRUCE STRUTS.
12. REAR COCKPIT WAS ADAPTABLE FOR GUNNERY.
13. ORIGINAL IDENTIFICATION MARKS WERE RED, WHITE AND BLUE ROUNDELS (1918).

BRACE WIRES ARE IN PLANE OF FRONT AND REAR WING SPARS

MAGNETIC COMPASS

WING CELLULE AND STRUCTURAL CONFIGURATION SAME FOR VE-7, VE-9 AND UO-1 SERIES

WRIGHT J-4 RADIAL AIRCOOLED ENGINE

BRASS PROPELLER TIP

WIND-DRIVEN DUAL VOLTAGE RADIO GENERATOR

INSIGNIA

1.83° DIHEDRAL

AILERON LINK CABLE

TIE

WING TIP PONTOON BRACING

GAP 4'-6"

STREAMLINE STRUTS

LANDING WIRES

SEE FLOAT INSTALLATION SHEET NO.5.

WALKWAY

DRAG WIRE

FLYING WIRES-DOUBLE SPRUCE STRUTS

ANNULAR AIR ENGINE EXHAUST MANIFOLD

UO-1

(U.S.NAVY SHIP PLANE)

ORIGINAL FLOAT INSTALLATION

FLOAT INSTALLATION ON LATE PRODUCTION PLANES

SAME STRUT CONFIGURATION ON VE-9

STERN SECTION VE-9 ONLY

SAME AREA AND HORIZONTAL TAIL USED ON VE-7, VE-9, AND UO-1, AND FU-1

SAME PONTOON CROSS SECTION ON FU-1

LIFT TYPE HORIZONTAL STABILIZER

WING FITTING

FAIRLEAD

ELEVATOR CONTROL CABLES(2)

RUDDER CONTROL CABLE

FUEL QUANTITY GAUGE

POWER AIR PUMP INDUCTION MANIFOLD

FILLER CAP

FUEL SHUT-OFF VALVE

AIR PRESSURE INDICATOR

HAND AIR PUMP

FUEL PRIMER

THROTTLE

PILOT

PET COCK

RUDDER 30° RIGHT-LEFT

FABRIC COVERING

ELEVATORS-20° UP-DOWN

13 GALS.

NO.26 TERNE PLATE

FUEL SHUT-OFF VALVE

FUEL STRAINER

CARBURETOR FUEL DRAIN AIR RELIEF VALVE

FUEL SYSTEM

(GRAVITY-AIR PRESSURE TYPE-VE-7 & VE-9)

PROCURED IN QUANTITY IN 1918 FOR U.S.ARMY AIR SERVICE (MODEL VE-7)
LIMITED PROCUREMENT IN 1920 FOR U.S.NAVY (MODEL VE-9).
LIMITED PROCUREMENT IN 1921 FOR U.S.MARINES (VE-9 HISPANO-SUIZA)

VE-7

(U.S.ARMY TRAINER)

FIXED SURFACE -1.25° ANGLE OF INCIDENCE TO THRUST LINE

U.S.NAVY SERIAL NO.

A-5698 U.S.NAVY

TRAILING RADIO ANTENNA WEIGHT

ARRESTING HOOK

RED WHITE BLUE

MAGNETIC COMPASS
BRACE CABLE
CARBURETOR AIR INDUCTION
RADIATOR CAP
FUEL FILLER
AILERON LINK CABLE
INSTRUMENT PANEL ACCESS
STORAGE COMPARTMENT
FAIRED TURTLEDECK
ALUMINUM ALLOY FAIRING

STEEL PROPELLER HUB

WRIGHT E-2 180 H.P. ENGINE

POLISHED ALUMINUM ALLOY RADIATOR SHELL

WALNUT PROPELLER

DRAIN PLUG

MOORING BIT

8/2

U.S.S. OKLAHOMA

STEP

CONTROL STICK ACCESS PANEL

AILERON CONTROL HORN

U.S.NAVY SQUADRON MARKING

DRAIN PLUG RING

CHINE WALKWAY DOUBLER

FOR CARRIER OPERATIONS A VE-7 LANDING GEAR WAS INSTALLED

LOAD WATERLINE

MODEL VE-9 FITTED WITH A LANDING GEAR AND EQUIPPED WITH ARRESTING DEVICES WAS THE FIRST NAVAL SERVICE TYPE TO LAND ON THE U.S.S. LANGLEY, THE U.S.NAVY'S FIRST AIRCRAFT CARRIER UNDER WAY AT SEA.

VE-9

(U.S.NAVY SHIP PLANE)
(PROCURED IN 1921)

(HEIGHT SCALE)

(LENGTH SCALE)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

CHANCE VOUGHT

THE FLOAT BRACING IS RIGGED IN SUCH A WAY THAT WHEN THE AIRPLANE IS FLYING, THE LONGITUDINAL CENTERLINE OF THE FLOAT IS 4° INCIDENCE TO THE THRUST LINE.

MAIN PONTOON COVERED WITH 5-PLY PLYWOOD. PLIES AT 45° TO EACH OTHER.

WASHED OUT WING TIP

SAME WING PLANFORM ON VE-7, VE-9 AND UO-1

FORMER RIBS

RED WHITE BLUE

HISPANO-SUIZA TYPE "E"

RATED H.P.	180
RATED R.P.M.	1800
BORE	4.72"
STROKE	5.11"
DRY WEIGHT	478#
COMPRESSION	3.33

DRAG WIRE HISPANO-SUIZA MODEL "A" AND "E" WERE INTERCHANGEABLE

HISPANO-SUIZA WATERCOOLED ENGINE MODEL "A" 150 H.P.

VE-7 DESCRIPTION

WING AIRFOIL	R.A.F.15
WING AREA(2)	283 SQ.FT.
STAB. AREA	18 SQ.FT.
ELEV.AREA(2)	17 SQ.FT.
AIL'N AREA(4)	39 SQ.FT.
FIN AREA	8.3 SQ.FT.
RUDDER	8.4 SQ.FT.
WT.EMPTY	1360 LBS.
WT.LOADED	2100 LBS.
WT SQ.FT.	7.4 LBS.
WT. H.P.	11.6 LBS.
CLIMB 6500'	32.5 MIN.
CLIMB 10,000'	17.00 MIN.
SERV.CEIL.ING	16,000'
DURATION	2.33 HRS.
MAX.SPEED 5,000'	111 M.P.H.
MAX.SPEED 10,000'	100 M.P.H.
LANDING SPEED	40 M.P.H.

ANGLE OF INCIDENCE TOP WING 1.75°

ANGLE OF INCIDENCE BOTTOM WING 2.25°

AILERON MOVEMENT UP-DOWN 90°

THANKS IS EXTENDED TO THOSE THAT ASSISTED TO MAKE THIS PRESENTATION POSSIBLE:
WILLIAM LARKINS, SECRETARY, AMERICAN AVIATION HISTORICAL SOCIETY.
ESTHER B. MUELLER, AIR FORCE CENTRAL MUSEUM, TECHNICAL SERVICES DIVISION, REFERENCE BRANCH.
RANDOLPH BRANDT-PHOTO COLLECTION.
ARTHUR SCHOENI, CHANCE VOUGHT AIRCRAFT.
WILLIAM MIER, CHANCE VOUGHT AIRCRAFT.
F.E.DALLY, CAPT. U.S.N. TECHNICAL DATA DIVISION, BUREAU OF AERONAUTICS, U.S.NAVY.

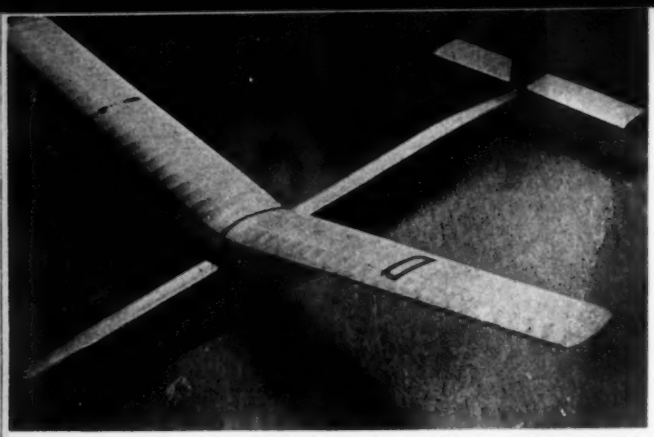
(DRAWN FOR MODEL AIRPLANE NEWS BY WILLIS L. NYE)

ES.

VOUGHT VE-7

ENGINE INSTALLATION: WRIGHT-MARTIN HISPANO-SUIZA MODEL "A", 150 H.P., WATERCOOLED ENGINE.
PROPELLER: LIBERTY, 2-BLADE, 8'-4" DIAMETER

1.83° DIHEDRAL
INSIGNIA
1.75° INCIDENCE



Strong, slim, all-wood fuselage, plus a Bilgri-type folding propeller, give this Wakefield design a glide unmatched by most gliders.

Hornisse

Wakefield Winner

Moderate wing taper and Vee dihedral, rather than polyhedral, were part of a time-consuming job. The designer, Samann, on the right.

Is this the most efficient Wakefield model ever built? Many people in Europe think so.

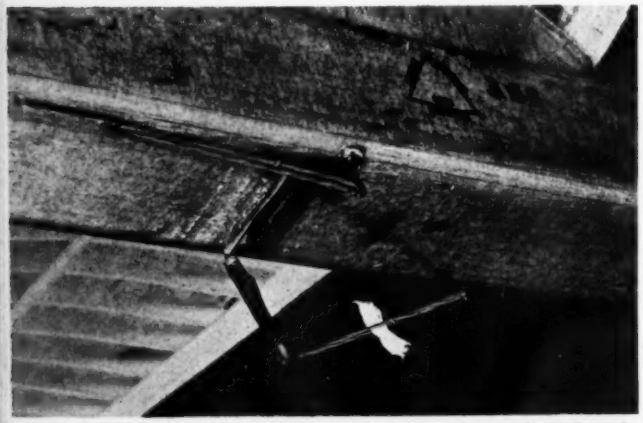
by GUSTAVE SAMANN

► The Wakefield model "Hornisse" is the result of a series of developments begun in 1937. With an early version of this model I placed first in the 1951 German Nationals. In 1952, for the first time after the last war, I competed in the Wakefield Cup held in Sweden. With a model built from the same plan, my wife placed 8th in the 1953 Wakefield event in England, flight time being 14 min., 34 sec. During the 1954 German Nationals, I placed first with 5 max flights. In 1955, Hornisse won the seven-man fly-off to take the Wakefield finals. After five maximum flights for a total of 9:00, it clocked 3:15 on the sixth and winning flight. This made six consecutive max's.

Flying performance of the model in still air is above 5 min. Hornisse gains great height in a steady climb and her gliding performance for a rubber-driven model is outstanding. Main features are the fin, placed comparatively far behind the wing, and the unconventional design of the tail plane sections, using an 80% thick Clark Y section, trailing edge being 12% of chord wide, dropped at an angle of 20°. This results in a much steadier climb and a glide not easily affected by gusts. Adjustments for varying weather conditions are unnecessary.

High aspect ratio wings add performance to the glide. Wing sections used are from the famous Hungarian modeler, Benedek. The high pylon was necessary because of the slim fuselage. The propeller is a variation of the Bilgri prop. For launching by hand the undercarriage and the two tailskids can be omitted without reducing flying performance.

Overall construction is simple and strong to assist repairs in emergencies. Up to date, in spite of flying the original model in tough weather and on unsuitable flying grounds, no need for repairs have been necessary. Nearly all balsa used on the model is medium grade. (Editor's note—Since the original plan and article stipulates certain materials and measurements (*Continued on page* 58)

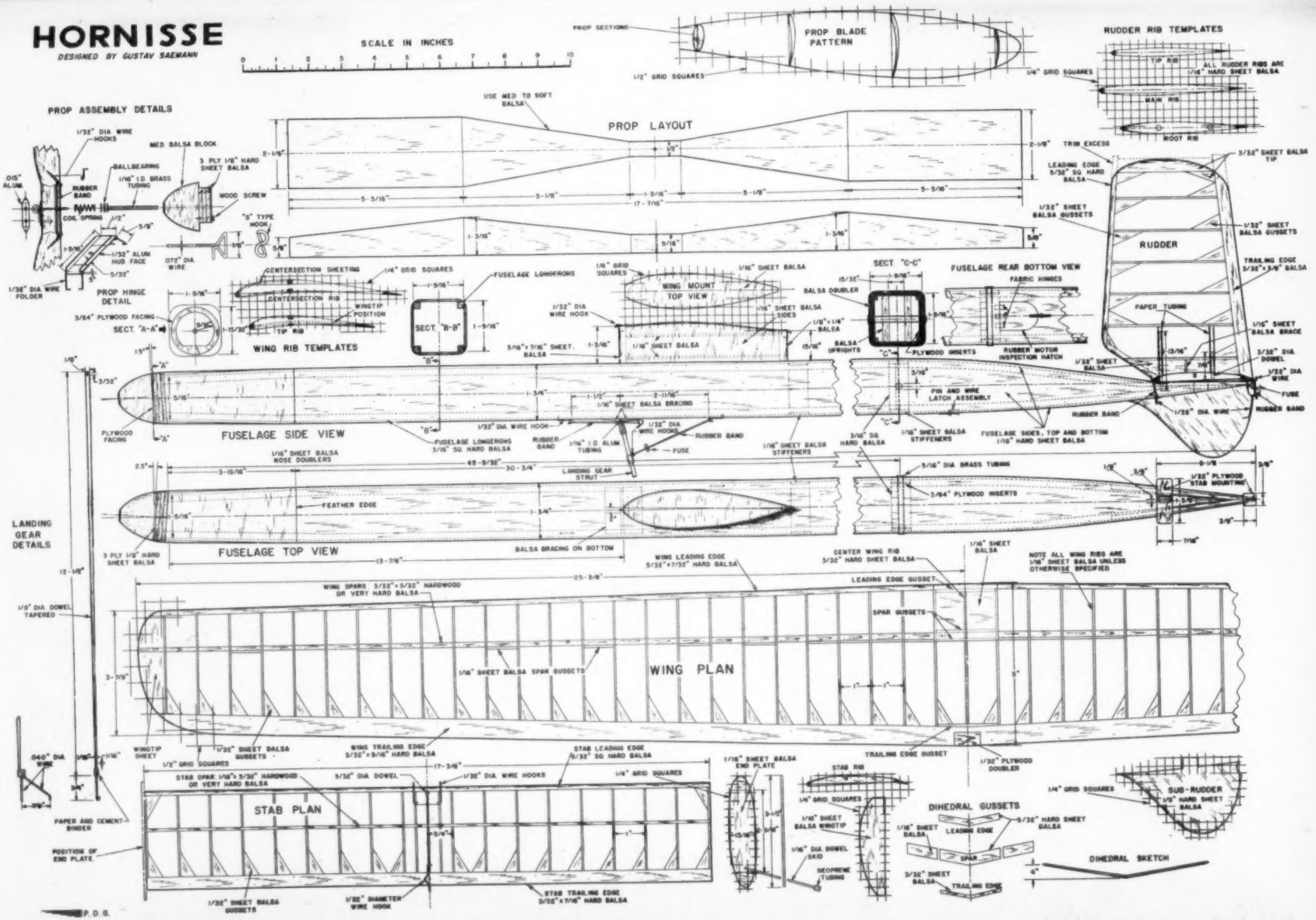


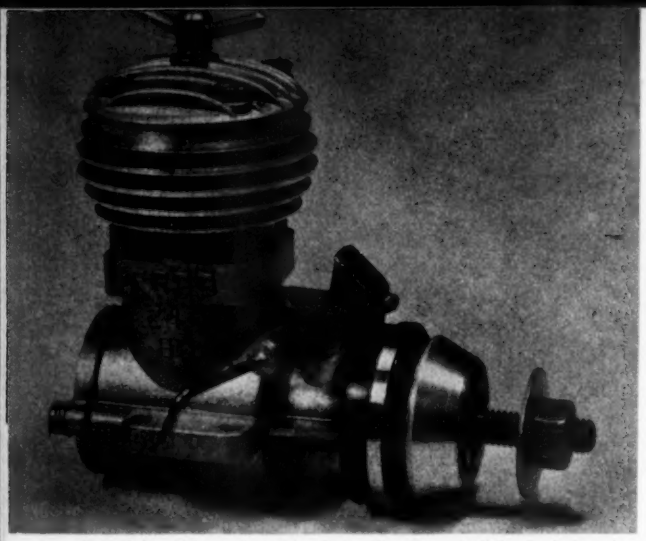
Detail study of the landing gear, shows hinging method, the rubber retraction band, the small fuse to pull gear up after take-off.

Centrifugal force swings prop blades out; rubber band helps to fold them for glide. Note winding loop and the marks for nose alinement.

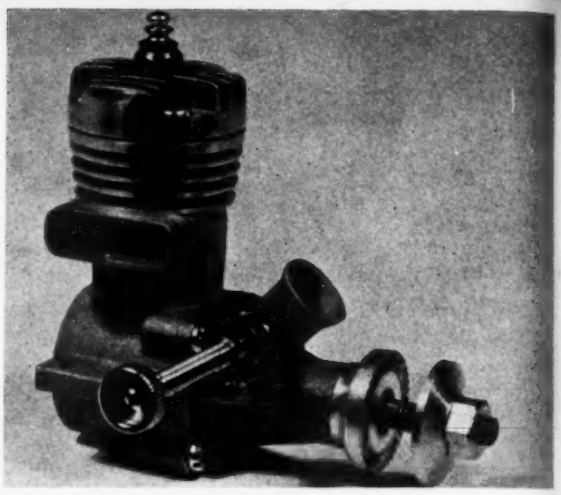
HORNISSE

DESIGNED BY GUSTAV SAEMANN





Powerful quick-starting Diesel is the Frog 249BB. Exclusive for the American market is a special hopped-up version. Bearing seal.



Worthy addition to the ranks of the popular .15 glow motors is this new Japanese-made Enya. Equipped with flexible needle valve.

Import Review

by P. G. F. CHINN

Variety is the spice of life and, in this late round-up of new foreign-made engines, variety abounds. An authoritative analysis.

This month's selection of imported motors emphasizes the widely differing approaches made by individual foreign designers to a common objective. In this case, the objective is in the category of popular multi-purpose motors of .15-.20 cu.in. displacement. Within the limits of this specification, four designers have managed to differ in their views to the extent of using three types of induction, two types of ignition, two types of main bearing and three basic types of cylinder assembly.

Enya 15 Model 3101

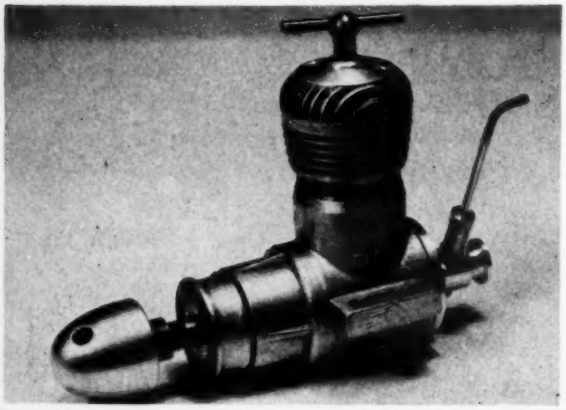
In this recently introduced Japanese product, is found the nearest approach to the well-proven American layout: glow ignition, shaft induction, a plain, bushed bearing and a loop-scavenged cylinder. It adds up to what we would call a nice motor. There have been more exciting designs, but the Enya starts readily, handles easily, has plenty of power, is well built and attractive in appearance.

Unlike the K.&B. and O.S. 15's, the Enya uses an integral casting for the crankcase and cylinder barrel, with separate main bearing housing, as on certain front rotary McCoy models. A drop-in liner is employed, flanged at the top, upon which is seated a deeply finned alloy head secured by four screws into the cylinder casting. No head gasket is employed. All the castings are of excellent quality. The front housing has a cast-in bronze bearing.

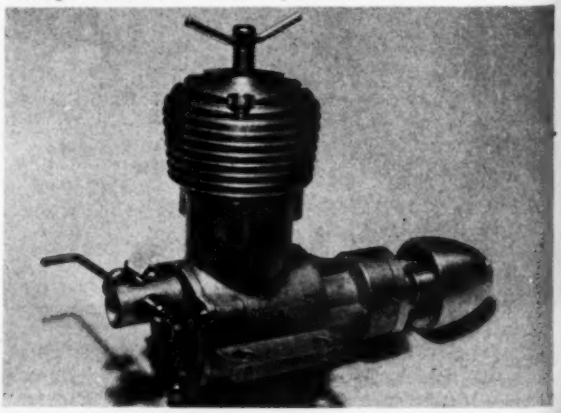
The crankshaft is of the full disk web type with machined-in crescent counterbalance. It has a .355 in. diameter journal and a ¼ in. gas passage. A long, rectangular intake port, ⅜ x 19/64 in., is featured, giving a 180-degree admission period. A light cast-iron piston with straight baffle is used, having a full floating wrist pin with aluminum end pads. The conrod is diecast with a bronze bush at the lower end. All bearings are well fitted and accurately alined.

The Enya 15 has a bore and (*Continued on page* 42)

Elfin BR 2.49 from England, has twin ball bearings, reed valve induction. Supposedly a match for any production .15's in world.



Taifun Super 21 from Germany. Features a disk valve and twin ball bearings. Available in limited quantities, but can turn a club.



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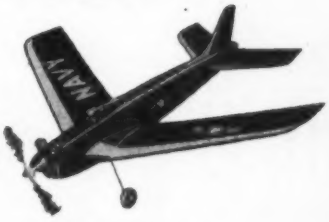
An outstanding favorite with all ½A model builders for years! Jigtime construction, rugged and so easy to build and to fly! Performs equally well in free flight or control line. Wingspan 27".

kit G-5 **1.95**



ARROWJET 24

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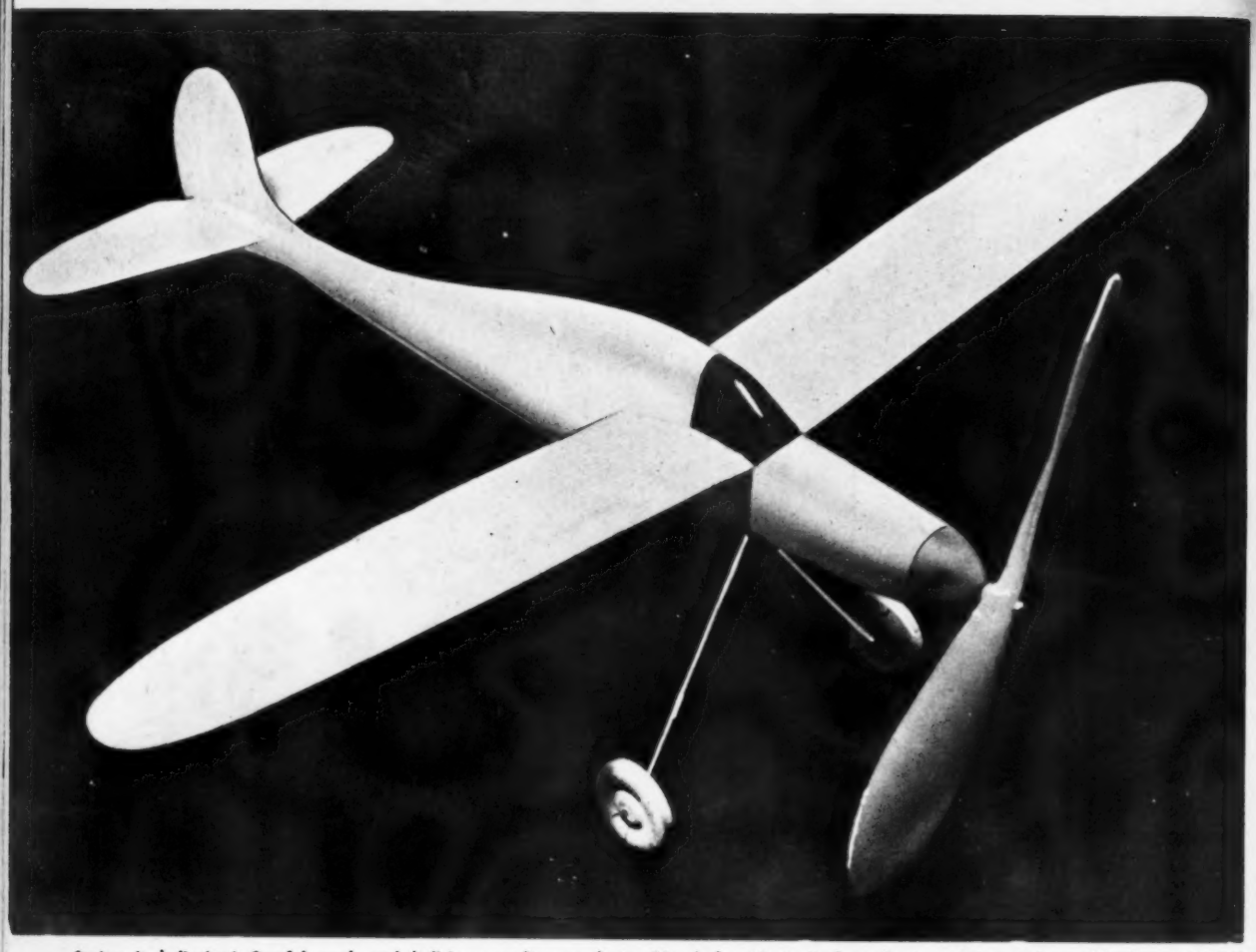


Seeing is believing! Careful work and judicious sanding result in this sleek midget. Craft really is a flying scale model of a Wakefield.

MIDGE

By ED LIDGARD

Only one foot in span, this rubber model is big eyeful. It flies—pretty good, too!

► If you're looking for a nifty one-evening project, go no further friend—this little rubber ship was designed just for you! Start by tracing or pin-pricking the main full-size parts (A-E) on to 1/32" and 1/8" medium sheet, then cut them out with a sharp modeling knife or razor. Building is real easy, but here are a few notes to speed things along.

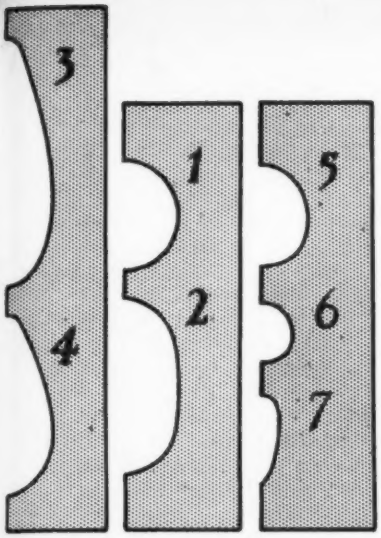
Follow the building sequence shown at right (fuselage sections also are given). Check carefully that flying surfaces line up correctly with each other and note that the dihedral is measured between the wing tips and building board, with fuselage resting flat on latter. In the side view, the landing gear legs are bent forward 3/4". Dope black tissue in place to represent the cabin. Dope undersurfaces of wing panels to maintain undercamber and dope the fuselage for handling protection.

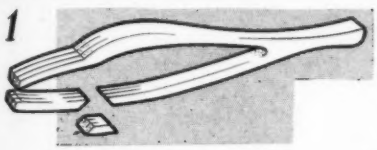
A 5" plastic prop can be picked up at your local hobby shop for reasonable cost. Use a piece of brass tube for a bearing and make sure that the nose block is a tight fit in the fuselage opening. A single 5½" loop of well lubricated (glycerine, preferably glycerine and green soap from the druggist) ⅛" flat rubber will provide plenty of pep if you have used fairly light balsa. Sand a half circle in the end of a length of ¼" sq. balsa, loop the knot end of the rubber over it and push into the fuselage as far as it will go—then insert the 1/16" diameter dowel tail peg.

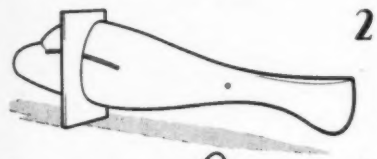
Add clay to nose or tail to achieve correct balance (see plan) and trim out any minor driving or stalling tendencies by bending the stab trailing edges up or down. Downthrust is built into the nose and maximum turns after about a dozen flights is 150-175 turns.

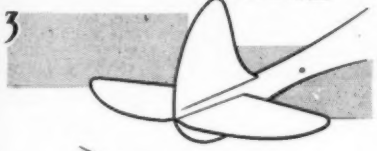
The rubber can be stretched out three times normal length, then wound by a mechanical winder, such as a drill with a music wire hook. When a row of knots appear, walk in toward the model gradually, still winding slowly. This avoids bunching the knots. Have a helper hold the model for you during this operation.

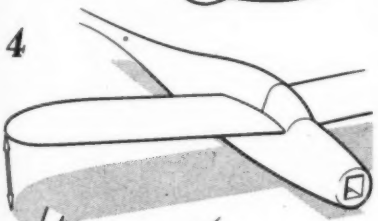
It is a good idea to test fly any model over tall grass, when practical. When you first hand glide the plane, aim at a spot on the ground about 15 feet in front of you, and launch the ship with a kind of sturdy, smooth push. Do not throw it. When the glide appears to be steady, not nosing up or diving, then try perhaps 40 turns on the rubber and launch again, as before, this time push very gently. The experts would adjust the glide first, then add downthrust (tilting the prop downhill) to keep the plane from stalling, or zooming nose high, when the propeller is pulling. As more turns are added the amount of downthrust may have to be increased.

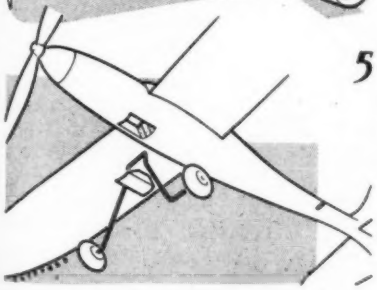




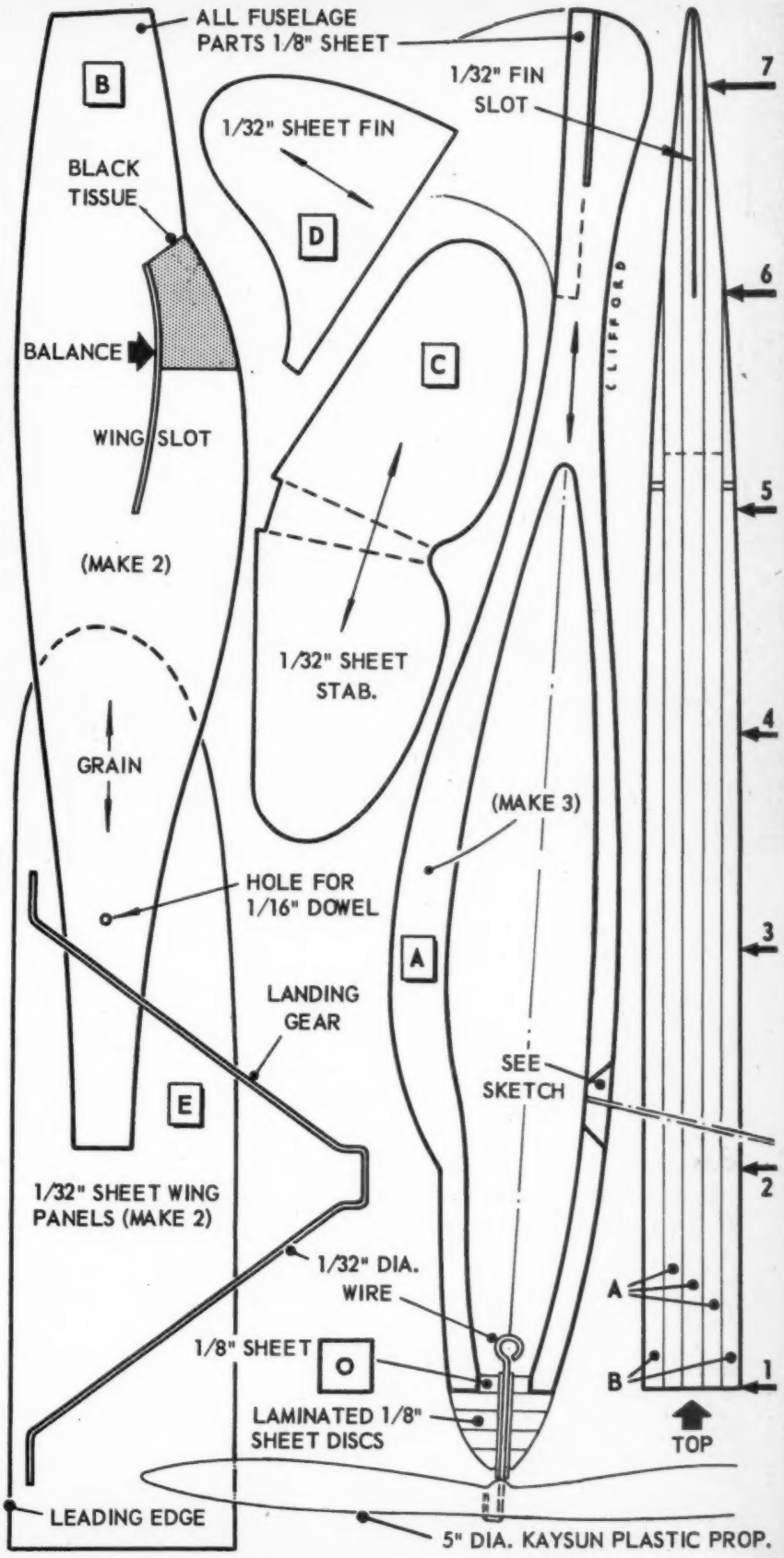


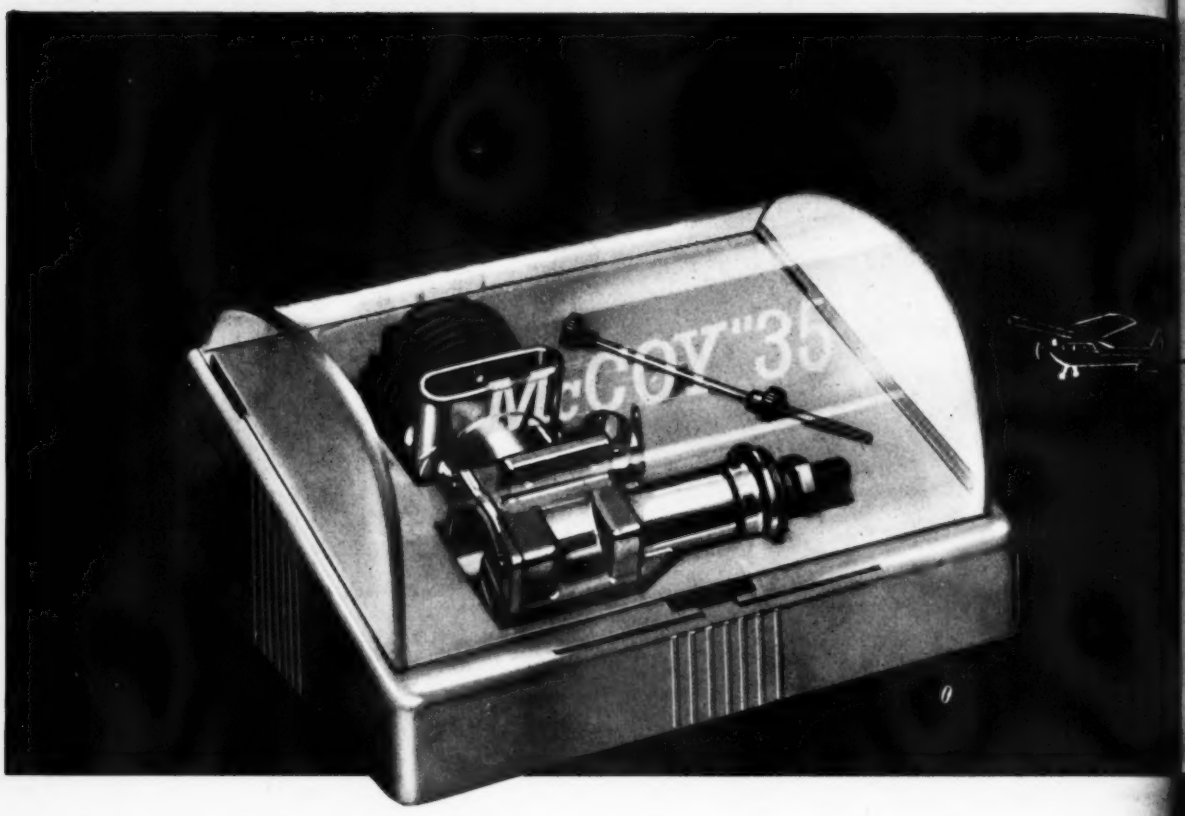






Here's a little more dope on that expert stuff! Try to make the ship circle when the prop turns. On rubber-powered models this usually calls for adding a little right thrust, just as you did downthrust. Sometimes a stall under power, can be converted into a nice climbing turn this way.





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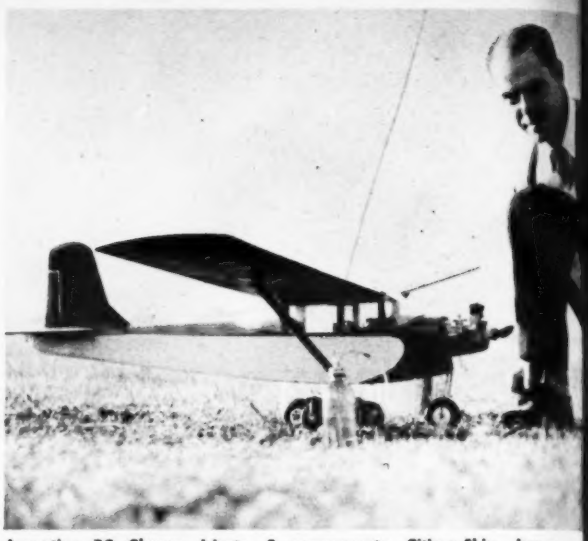
McCOY "35"

Red Head Glo Engine

Babcock team, left to right, standing: Chuck Hollinger, Keith Storey, Stu Babcock, Doc Townsend; kneeling: Ed Jones, Dick Schumacher.



Argentine RC Champ, Iriarte, 3 escapements, Citizen-Ship. Invertible dihedral worked like charm, vertical eights, spins, etc.

Radio Control NEWS

by EDWARD J. LORENZ

Winding up the equipment review for beginners, latest ideas, developments, and gadgets; new items, technical topics. Over!

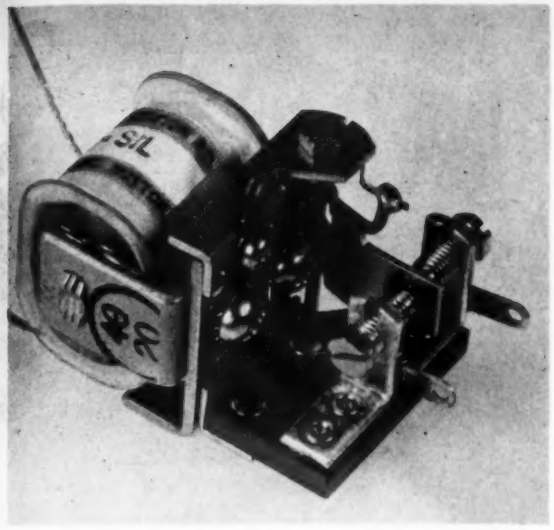
► All is not gold that glitters or, to put it another way, "don't shoot that duck Mister, that's my decoy." A. N. Garthwaite built an RC duck decoy. He used a conventional cork model, covered it with fibreglass and then hollowed it out enough to install a two-tuber receiver, batteries, an Aristo-Rev motor and an actuator made from a Wilson gear-train assembly. So far we don't have a report on its effect on the real thing but the trial runs looked mighty convincing.

This column mentioned that some of the boys in the North Carolina area were going to try aileron control. W. S. Deans of Downey, California, reports that Beckman and Leninger have used them with good results. Mr. Leninger of the San Francisco area has pioneered the use of simultaneous operation of two reeds and Colby Evett was the first flier to use such a system for flying. Not content with a 5-channel unit, the California boys are now using 8-channels and the Deans Co. reed bank is the best we've seen for its size. Remember, you have practically unlimited channels available with no increase in the number of tubes or regular circuit components. Looks like reeds are here to stay after quite a few years of sitting on the shelf. E. Rockwood, Menlo Park, Calif., introduced the reed system to the RC fan shortly after WW II.

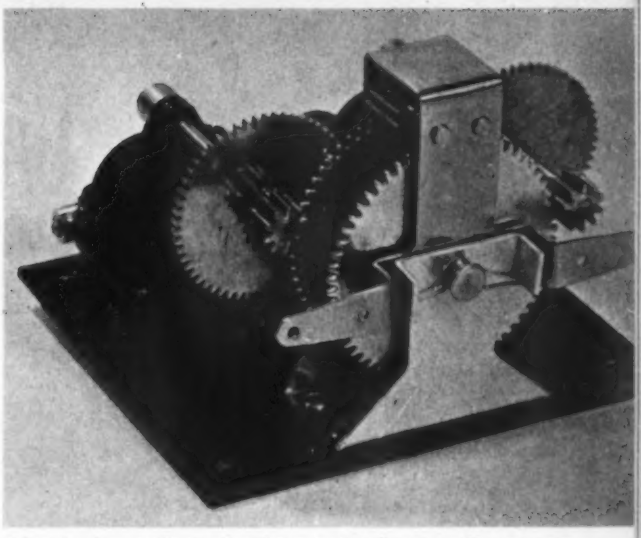
The Radio Control League of North Carolina celebrated their 2nd anniversary on Nov. 18th with a 24" cake, trimmed with model planes and figures. Emerson Ford, Durham, N. C., is the new President, Ed Hicks of Greensboro is VP, Warren Hall of Burlington is Treasurer, and Ralph Corelle of Salisbury is Secretary. Due to his excellent handling of events in the past year, Jim Thrift of Winston-Salem will handle the program for the coming year. Following the turkey supper and election, Mr. L. C. Tyack, Supervisor of Military Engineering for Western Electric, talked on guided missiles. A movie on the Nike was shown. Outside of some of the California groups, this Club seems to be the next best in the country, and as far as we can determine, the best in the east. If any club takes offense at this statement it can only mean that they should do a little more advertising. Dave Oestreicher, 834 Fairmont Avenue, Salisbury, N. C., did the reporting.

As this went to press, we received a telegram from Barney Snyder of Model Craft, Los Angeles, Calif., stating that on November 25th, Bob Gregory made the first radio-controlled boat run from Los Angeles Harbor to Catalina Island. Our map shows this to be a distance of about 25 miles. After reaching the island, there was still fuel in the tanks so the course was changed to Avalon on the southern tip of Catalina. Fuel was exhausted before they reached Avalon, however. The total running time was 4 hours and 32 minutes. An 82" fibre-glassed boat was used, powered by a glow-plugged Spitfire .65. The radio used was the Citizen-Ship 2-channel unit.

The East Bay Radio Controllers from the San Francisco area have sent in some interesting items on club doings, such as a 10-foot Monster (breed unknown) being built by Bob Stille, and Dale Root flying a Champion with CG 5-channel equipment. There are more deBolt Champions in the club than any other type plane, utilizing rudder only, 'mickey mouse' and 5-channel equipment. The As-



Sigma 4F relay features sturdy screw adjustable contacts, sensitivity. Companion, 26F, is reliable for low-current operations.



Robot Synchro, really good pulse actuator, for 5 to 10 cps, on 3-6 volts, uses two Victory motors and eliminates rudder wiggle.

cender, designed by Dale Root, and the Smog Hog by H. Bonner, are rapidly filling the California skies. Most fliers want lighter equipment above all else, compatible with reliability of course. The swing would be towards smaller multi-channel ships if the equipment were available. Our prediction is that completely transistorized receivers will be available within the coming year.

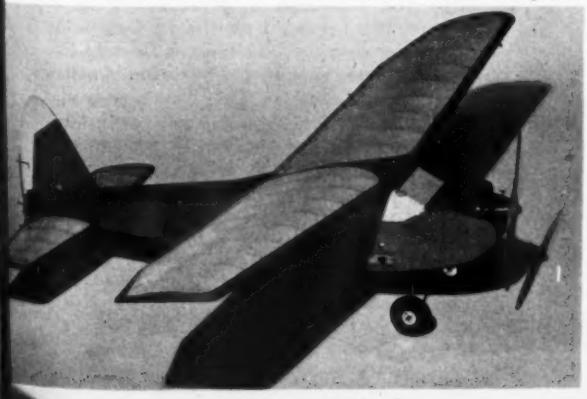
Everyone interested in a particular field of endeavor likes to know who the top men are and what they look like. Photo shows the Babcock Model's design and production team. Mr. Ferris Smith and Stuart Babcock made this team announcement in December of '56, and it represents about 100 years (total) of modeling and radio experience. Chuck Hollinger will concentrate on new plane and RC accessory designs and will continue with his excellent drawings for Babcock plans and instruction manuals. Keith Storey, well known in all phases of modeling activities, will head the team and coordinate its activities in customer services, sales, production and research in new and better products. Dick Schumacher, who has done much in the field of design, and in working with the AMA and FCC, will continue as consultant design engineer. Ed Jones will handle the nautical end of Bobcock Models, having designed 'Little Breeze' and other boats marketed for RC work. He was the project engineer for the Babcock servos and escapements.

Art Simmons, 124 Baker Avenue, Syracuse, N. Y., has been flying a sealed up (25%) version of the Champion and a deBolt Cruiser which was converted to a symmetrical wing bi-plane. Regarding the bi-plane, the stability is excellent and outside loops and vertical eights are taken as a matter of course. Art mentions a new type of interference which was encountered on "interference free" tone equipment. The entire flying group was having trouble until a ham from New Orleans signed off the air. This was picked up by one of the men while he was tuning his set with earphones. Here again, earphones will help locate trouble which doesn't show up when using a meter.

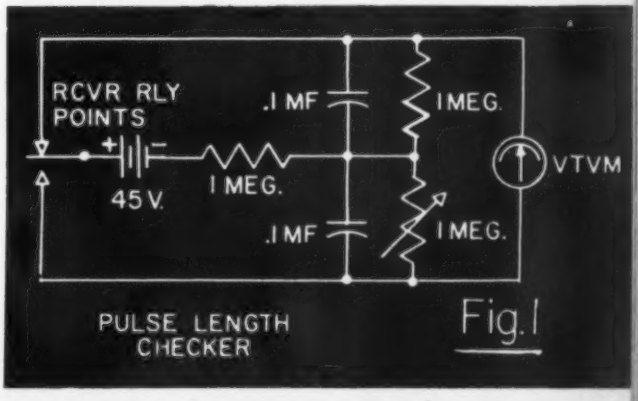
Just another reminder to send in your FCC registration. Remember that you submit one each for 27.255mc and 465mc if you have transmitters you wish to operate on those frequencies.

A photo shows Mr. Jose Ignacio Iriarte, the first-place winner of the Argentina RC Nationals, held around September of last year in Merlo, a suburb of Buenos Aires. Juan Pablo Ossoinak (LU7BM) did some excellent reporting which we'll elaborate on next month. Here are the statistics on the first-place winner. The 6-foot plane used a Torp .32 and Citizenship RC equipment. Rudder, elevator and engine-speed control was obtained, using Bonner compounds and regular escapements. Here is the pay-off on his plane: inverted flight is obtained by means of automatic invertible dihedral in the wings. This trick was developed in 1954 and has proven to be very successful. This is accomplished (*Continued on next page*)

New kit, the Aero Models RC Aero 9, is well thought-out item and has nice structural features. Shown here with Webra .09 power.



Life saver for the many people who have trouble making pulse system work like the articles say, bench tester shown is a must.



by means of spring loaded wing struts. This should give the California boys something to think about.

TECHNICAL TOPICS

In this issue we'll conclude our resume of RC gear for the newcomer. The past two months have covered single- and multi-channel radio equipment. This month covers actuators and accessories.

An actuator is a device used to transmit motion to the control surfaces or other devices to be moved. Actuators fall into two basic categories: rubber-powered escapements and motor-driven servos. The rubber-powered escapement is the simplest type of actuator; this class divides into the standard sequencing and the compound types—the latter does not require the individual to 'think' about the sequence. In the first, or sequence type, we have the NEWX line of escapements made by Newx Products, Union, New York. These are very compact, and due to special design, are capable of operating with considerable power, although the electrical power input is low. Models can be had which operate on from 2 to 6 volts, or directly in transistor circuits. The standard left, right and neutral movement can be had, in addition to a special 6-arm unit which can be altered, to give 'special effects. Prices start at $7.95.

Also available in this sequence type of simple escapement are the units made by Citizen-Ship Radio Corp., Indianapolis, Ind., and Bonner Specialties, Los Angeles, Calif. The Citizen-Ship PSN is a small compact unit, stated to be guaranteed for 25,000 operations. The price is $5.95 for the basic PSN escapement and $3.95 for the MSC motor speed control attachment. This MSC unit allows you to add to the functions obtainable from the basic escapement after you have gained a little practice. The Bonner Standard Escapement is also a compact self-neutralizing unit which sells for $6.95. Both units have low battery drain coils and are primarily control-surface actuators. Bonner Specialties also markets a complete Motor Control Unit for $9.95, based on the self-neutralizing escapement principle.

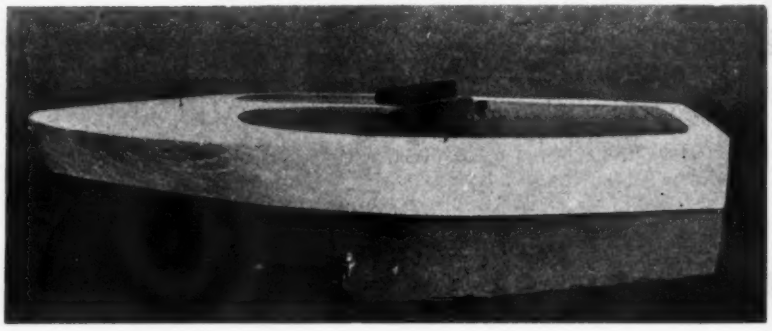
The next step-up from the regular sequence type escapement is the selective or compound type. This type of actuator allows you to make a left or right movement by merely keying your transmitter once or twice. Although the mechanical action goes through a sequence, the operator does not have to remember which movement is coming up. The three major manufacturers of this type of escapement are Babcock Models, Van Nuys, Calif., Bonner Specialties, and Citizen-Ship Radio Corp. The Babcock unit gives left or right control by (*Continued on page* 60)

Radio Control News . . .

CATALINA CROSSING

Big 80-inch fibre-glass covered boat roars by on test run. The scoops provide air for the water-cooled Anderson .65 Spitfire.

Standard outboard racer—do you see it?—indicates bulk of the channel cruiser, the Big Smoothie. A shark followed the RC boat.



by BOB GREGORY

Pilot's account the first crossing of 21-mile channel by an RC model boat or plane.

Citizen-Ship Dual Channel receiver almost lost toward bow. Fuel supply on cruise was 8 quarts.

WE pulled out of San Pedro harbor dock at 6:50 A.M., on November 25, and were outside the breakwater at 7:40 A.M. The pilot boat drifted to within about 50 ft. of the breakwater rocks. Then we turned on the transmitter, fired up the water-cooled Anderson Spitfire motor, put the boat in the water and ran the model around for final check up. After bringing back the boat for a little finer adjustment on needle valve, I circled it around to within 10 feet of the breakwater rocks, then off we went. Time was 7:50 A.M.

The ocean was choppy with very large swells. The first hour's running was disappointing; we made only about one mile and a half. The boat would get into a swell and almost stop, then up would come the swell and the boat really would take off. Though the pilot boat rpm was only 500, we did not think the model was going to catch up but gradually our rpm picked up to about 900 rpm, as the ocean started to smooth out at about 10:45 A.M. A big shark was sighted and started to follow the model (*Continued on page* 50)

FOREIGN NOTES

A monthly world-wide round-up of technical developments, designs, significant industrial products.

F. G. F. CHINN

France

These notes are being written a few days before the annual meeting of the FAI Models Commission, at which delegates from the various national model organizations are to discuss the future of FAI rules. Last year, the Commission came in for a lot of criticism following its recommendation of several new rules, the most drastic and unpopular of which was the doubling of the power-loading requirement for free-flight models. Following subsequent representations from many countries, the FAI later took the unprecedented step of declining to confirm the decisions of its Models Commission, recommending, instead, that the Commission reconsider the whole rules question at its next annual meeting.

What the precise outcome of this discussion will be we cannot prophesy. It seems extremely unlikely that the former proposals will now receive support from the majority of delegates. On the other hand, it has been suggested that a decision should be taken to make any new rules valid for a minimum period of four years; in which case, new rules formulated to take effect next year (1958) would have to remain unaltered until 1962. Provided that suitable rules are formulated, this would, no doubt, be a good move as it would give contest men a chance to try fresh designs in the sure knowledge that such designs would be granted a reasonable development period before the introduction of another new formula. However, in the event of a "no change" period such as this being laid down, it is obviously necessary that the rules governing model specification should take into account the possibility of further substantial improvements in model performance within the period and we may yet, therefore, see some stiffening in the formula relating to free-flight gas beyond the expected reduction in permissable motor run.

Great Britain

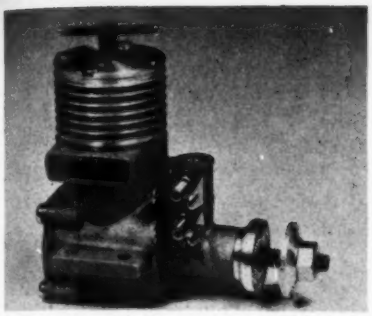
A new idea for hand-launched gliders—with, it is claimed, possible application to other free-flight types—comes from George Woolls. Dubbed 'kinetic energy control', it is a new way of overcoming the old bogy of excess lift causing a loop in the climb. It is based on the principle that if you hurl a stone with something tied to it with string, the stone goes first, towing the 'something' behind it. In this case, the 'stone' is the weighted nose of the glider and it can slide forward 3/16-in or so, relative to the rest of the model, being attached by means of a rod. The rod is connected with thread to an elevator which is tensioned with rubber against a stop for the best angle of glide.

When the model is hurled upward, it is grasped at the weighted nose-section (it is also provided with a suitable trigger to replace the usual wing root finger point) and as the nose goes forward, so the elevator is pulled down for a fast, loop-free climb. At the top of the climb, its kinetic energy expended, the nose-weight is returned to its 'retracted' position and the elevator moves up into the glide setting.

Hungary

Of all the countries unfortunate enough to be in the sphere of Soviet domination, Hungary has stood out as being the most openly 'Western-minded' in matters modeling. Not only have some of her leading

Oslo engine manufacturer, David-Anderson, built this Sea-Cat, held by Sigurd Heiret. A MAN design by Henry Struck, the Sea-Cat is ideal for the Norwegian fiords. Planing hull is excellent.



Enya .15 Diesel has many interesting features. Twin needle valves, unusual on Diesel engines.

model designers associated themselves with Western trends (take, for example, the Bob Palmer influence evident in the design of Hungarian stunt maestro Geza Vass's winning models); but, unlike those of her Iron Curtain neighbors, Hungary's contest fliers are frequent users of Western-built motors—notably American McCoys and Doolings, Italian Super-Tigres and French Microns.

The Hungarians also have some quite good motors of their own construction and, during the past year or so, efforts have been made to export a few of them. Of these, we have personally tested out three types. One of these is the Proton SM-03, a Diesel .15 of conventional design but notable for its exceptionally short stroke of only 12.4 mm (.433 in) as compared with a bore of 16 mm (.630 in). Whether these motors will now be seen in other countries, following the recent political unheaval in Hungary, is not yet clear, however.

Australia

Australian Nationals were to be held at Melbourne this year, after the close of the Olympic Games there and have been dubbed the 'Olympic Nationals'. The indefatigable Morrison Brothers, John and Russ, of Brisbane (and for whom this is a trip of 1200 miles), tell us that they hope to be competing in at least 21 events. Russ won the junior championship last year and both boys should be hot favorites —in the team-racing and free-flight events in particular.

Once again an attempt is being made to establish an Australian monthly model magazine. Behind the effort is Robert A. Rose, former secretary of the Australian M.A.A. It is hoped to have the first issue on sale by the time these words appear.

Italy

Plastics are clearly well established in the 'solids' field, likewise for flying model accessories, such as props, cowlings, etc. and even for complete ready-made half-A control-liners, but a new approach is used by Adriano Castellani, well known Italian model builder and proprietor of the firm Aviomodelli of Cremona. New Aviomodelli c/l kits, including a 46-in. stunt job as well as scale models, use molded plastic fuselage shells in place of balsa. Some also have composite wing construction using a full-depth hollow plastic leading edge section.

West Germany

World famous German toy and model firm 'Schuco' whose particular specialty has been their ingenious working scale model cars, have introduced two ready-built control-line model planes using Webra .049 and .10 motors. These faithfully follow the traditions of Jim Walker's Firebabies, being ready painted and fuel proofed, complete with engine, tank, prop, control lines (*Continued on page* 44)

MAN at Work

(*Continued from page* 7)

we've never seen before, and we've been looking at airplane pix since the ark got airborne. This is a bonanza for scale and historic fans.

And a few words about Frank Schmidt, and his radio control equipment. Frank began with that famous Pittsburgh station KDKA. If you are 35 or 40, your father may have tuned in KDKA at night. Younger? Ask grandpa. First heard of Frank at an early pre-war Nats, when he amazed the usually poised Macnabb by tuning his 465 set—in those days this was considered a task for the factory. Flying early Rockwood reed equipment (the first commercially in our field) Frank was moved to try his own ideas—then to become a manufacturer. Once sat around a roaring pot bellied stove late at night in Frank's shop, then in a barn, and listened to his ideas and, incidentally, learned from an experiment that we could hear almost as well as dog (don't blow that whistle, you!). Frank would be the last one to describe himself as a young chicken, and it was an amazing demonstration of what we like to talk about as American opportunity, to see how he brought those ideas to fruition. During the past year Frank overcame difficulties that would have finished many of us "kids." Fortunately, Schmidt Radio Controls is still very much in business and going strong. It's good stuff. Of course, Babcock, CG, and many others also are good so we can't, in fairness, say that one is better than the other. They all have to be good and choice depends on individual requirements. We do want to join with his many friends in telling Frank that his demonstration of never-say-die has been an inspiration to all of us.

Two little books (25 each): Gas Model Plane Construction, Glo-Engine Handbook, by Bernard Winston, Winston Publishers. Bernie, incidentally, is the proprietor of AHC. In self defense, we suggest hopefully that the many readers who swamp us with questions will make a point of getting these booklets. They are jammed with fine type and illustrations . . . teachers and students interested in aviation will be interested in "Extraclass Activities in Aviation, Photography, and Radio for Secondary School Pupils." Issued by the Department of Health, Education and Welfare; Office of Education, Washington, D.C., this bulletin may be obtained for 25c from the Superintendent of Documents, Government Printing Office, Washington 25, D.C. . . . many things, strange and otherwise, go across this desk. Here's a boxcar from Zev Goldberg, of Model Hobbies, Philadelphia. What this has to do with the Strategic Air Force, we don't know, but the HO crowd (in the Quaker City, yet—that's a pun pal) no doubt will appreciate it.

• • •

► Oh, yes, another—and the last, we promise—deserved plug. (A little traveling music, please.) Unbreakable props. Reminds us of the time we bought out a dealer of 63 props for Windy Joe, and a manufacturer sent us 50 more to try. We broke them all, plus 111 others—the log book sez, and that with a trike gear. This suggests that the best way to start a bank account is to get an unbreakable prop. Years ago tried some English unbustables. Rather clumsy, heavy, and of lower performance than the wood toothpicks. Also,

(*Continued on page* 42)

6 NEW MODELS FROM SCIENTIFIC

Now at your favorite hobby shop! These 6 sensational new models from SCIENTIFIC. They're simply terrific performers! Every one a super value! Here's modeling fun and thrills like you never dreamed possible . . . and for so little money!

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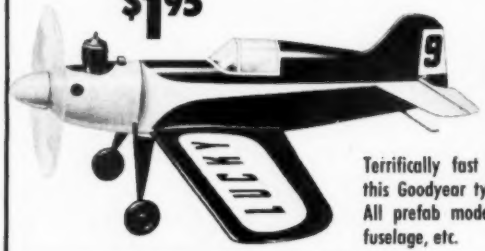
features JET FIGHTER styling

18" WINGSPAN
For Gas Engines
.039 to .074
Deluxe profile U-Control model . . . with a formed bubble canopy. All prefabbed.

$1.29

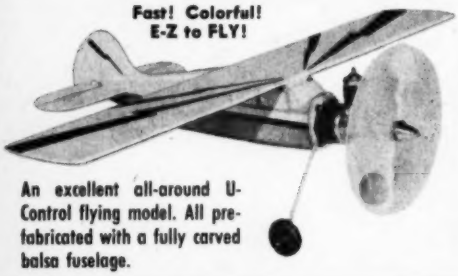
$1.95 LUCKY RACER



18" WINGSPAN
For Gas Engines
.039 to .074
Terrifically fast flying model of this Goodyear type racing plane. All prefab model with a carved fuselage, etc.

RED FLASH

Fast! Colorful! E-Z to FLY!



An excellent all-around U-Control flying model. All prefabricated with a fully carved balsa fuselage.

18" WINGSPAN
For Gas Engine
.039 to .074

$1.69

BEECH "BONANZA"

18" WINGSPAN
For Gas Engines
.039 to .074
An exciting U-Control scale flying model. All prefabbed with carved fuselage, etc.

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LARK SPEEDBOAT

ALIVE WITH ACTION

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20" LENGTH. 7" BEAM
New streamlined speedboat for any Outboard Engine . . . gas or electric. Features advanced "Waterama" bow design. All prefabricated.

CESSNA 182 Tricycle

18" WINGSPAN
For Gas Engines
.039 to .074
Brand New! U-Control scale flying model of this world famous plane. All prefabricated with carved fuselage, etc.

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2 MORE HIT MODELS . . . FROM SCIENTIFIC

Terrific Fun!
TAKES OFF AND LANDS ON WATER

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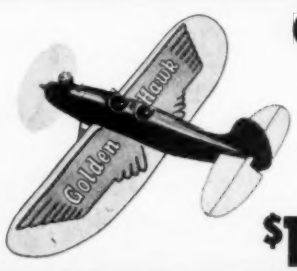
18" SPAN For .035 to .074 ENG. Exciting fly-it-yourself seaplane! It's U-Control . . . easy to fly and a cinch to assemble from its fully carved fuselage and all prefabbed parts.

$1.95

GOLDEN HAWK



18" WINGSPAN
.035 to .074 ENG.
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[illegible] 'gull' wing [illegible] U-Control [illegible]

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SPAN: 18" For .035 to .074 Eng.
U-C model of this sensational 600 m.p.h. jet. Flies like a dream. Prefabbed, carved fuselage.

Chris-Craft "HORNET" $1.95
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Real speed demon! Semi-scale with our new 'Waterama' design. All prefabbed. For R/C too.

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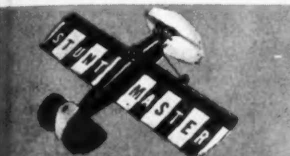
Chris-Craft cabin cruiser model (semi-scale) with our new 'Waterama' design. All prefab kit.

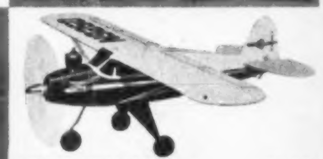
RED DEVIL $1.6[illegible]
SPAN: 18" For .035 to .074 Eng.
[illegible]



STUNT MASTER $1.50
SPAN: 18" For .035 to .099 Eng.
[illegible] ½A stunt plane ever . . . [illegible] with a carved fuselage, etc.

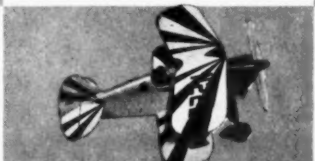
MISTER. MULLIGAN $1.69
SPAN: 18" For .035 to .074 Eng.
Scale model of this famous trophy race champ. U-Control. All prefab, w/carved fuselage, etc.

U.S.S. NAUTILUS $1.[illegible]
18" Hull. Rubber Power Included.
Actually operates like a real sub. [illegible]



PIPER TRI-PACER $1.69
SPAN: 18" For .035 to .074 Eng.
Tricycle landing gear . . . safer landings on this scale U-C model. It's prefab, a terrific flyer.

LITTLE IKE $1.19
SPAN: 18" For .035 to .074 Eng.
Exciting U-Control model of this grandaddy of 'Goodyear Trophy Racers.' Super-prefab. Profile.

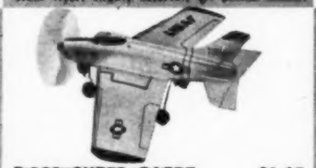


LITTLE STINKER $2.[illegible]
SPAN: 16" For .020 to .074 Eng.
Betty Skelton's (Pitts Special) championship stunt flyer. Highly colorful, all prefab model.

NO. AM. T-28 TRAINER $1.19
SPAN: 18" For .035 to .074 Eng.
Fly-it-yourself version of U.S.A.F. training plane. It's U-Control, a rugged profile flyer. Prefabbed!

KP-300 DREAM BOAT $1.[illegible]
"½A" Eng., CO_2, or Elec. Motors
[illegible]

F4U-5N "CORSAIR" $1.19
SPAN: 18" For .035 to .074 Eng.
Profile fly-it-yourself model of famed WW II fighter. U-Control. Flies like a dream. Prefab.

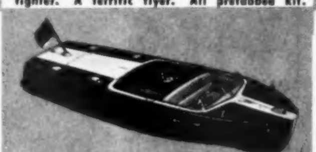


F-100 SUPER SABRE $1.95
SPAN: 18" For .035 to .074 Eng.
Scale model of first U.S. supersonic jet fighter. A terrific flyer. All prefabbed kit.

TORPEDO SPEEDBOAT $2.[illegible]
LENGTH: 20" BEAM: [illegible]"
[illegible] for OUTBOARD engines. [illegible]

LITTLE SPITFIRE $1.19
SPAN: 18" For .035 to .074 Eng.
Fly-it-yourself version of famous hero of the 'Battle of Britain'. Profile U-Control. Pre-fab.

BEECHCRAFT "17" $2.95
SPAN: 16" For .020 to .074 Eng.
U-Control, prefabbed model has carved balsa fuselage, formed balsa wings, metal cowl, etc.



RIVIERA $3.[illegible]
For "½A" Eng. or Electric Motors
Authentic Chris-Craft replica with 12" carved balsa hull & brass fittings. All parts finished.

FIREBIRD RACE CAR $1.89
LENGTH: 18" For .035 to .074 Eng.
New, futuristic race car that speeds to 60 m.p.h. It's prefabbed, 4 rubber wheels, carved body, etc.

BUCKEYE JR. $3.[illegible]
LENGTH: 14" For .020 to .074 Eng.
[illegible]

"DART" SPEEDBOAT $1.89
For ½A Engines .035 to .074
[illegible] speedboat, replica of U.S.N. Convair Sea Dart.' All prefab model. Exciting to race!

LITTLE MERCURY $1.50
SPAN: 18" For .039 to .074 Eng.
U-Control carved fuselage model. It's completely prefabbed. A cinch to assemble.

BUCKEYE JR. CABIN $3.9[illegible]
For "½A" Eng. or Electric Motors
[illegible]

LITTLE MUSTANG $1.95
SPAN: 18" For .020 to .074 Eng.
Famous escort fighter model. Prefabbed. Features carved balsa fuselage, formed balsa wing.

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a hot engine could melt out the hole. Spectators used to tweak the blades to see if it was true and then leave a blade bent at 45 degrees, rather disconcerting when you went to flip the engine. (Centrifugal force works wonders). So over a year ago, Ralph Krausen, Windsor Engineering, got us to try some early, experimental props. Now, when MAN at Work tries anything, it doesn't work right. Radio manufacturers figure us the last acid test. (If it works for him, we put it on the market!) So Ralph went away and changed his formula, and defies anyone to bust a prop.

Turns out that many well-known fliers not only are failing to bust these props but, and this is especially interesting, swear they got top performance. Dale Kirn, the great Mono-Line speed flier, finds the Perm-A-Prop satisfactory on a 29 in stunt and says it proved itself on two occasions. . . . Wayne Sutherland finds it good in stunt and combat. So do Fran McElwee and Howard McEntee in radio. This could go on and on. RC boys like the idea for touch-and-go for obvious reasons. Enthusiastic believers show us pix of horrible crack-ups—but nary a broken prop. Some tell us that you do have to watch balance. An unbalanced prop causes vibration. RC fliers automatically check all props, any make, for balance. MAN at Work usually scrapes off varnish on one blade (or surface wood) to get perfect balance. The best way is to slip a close-fitting piece of tubing through the prop hole, then place the tubing on top of two parallel razor blade edges set into uprights checked with a level. Do this once and you'll be horrified at some of the props you've already "balanced." Balance may have to be observed carefully on these unbreakable props—but that's a small penalty considering the benefits. Balance them, if necessary, as described.

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► Events in Europe prove that Patrick Henry had no monopoly on liberty. The price of continued liberty is preparedness. Preparedness includes strong air power. Air power, it has been demonstrated (and acknowledged publicly by the services), benefits from model airplane building. Airplane modeling is encouraged by many knowing agencies, city governments, and organizations. According to Newsday, the town Valley Stream, Long Island, recently barred modelers from using the city dump as a flying site . . . this, perhaps, is an effective ending to a column but the implication is too depressing. Let's consider then, a certain friend of ours who also has troubles from on high. His Mrs. disapproves of his modeling. Whenever he runs an engine in the basement he turns up the Hi Fi. When she complains, he simply asks, "What's the matter, don't you appreciate good music?"

Import Review

(*Continued from page 28*)

stroke of 15 x 14 mm. (.5905 x .5512 in.) giving a displacement of 2.44 c.c. or .151 cu.in. It weighs 4.4 oz. complete. The motor is for beam mounting but, recessed into the back of the crankcase are three lugs, center-popped ready for drilling and tapping to enable radial mounting studs to be fitted, should this be desired. The venturi is bored 7 mm., but is fitted with a reducer which cuts the choke diameter to 6 mm. This, of course, is further restricted by a spraybar type needle-valve assembly.

Our test model Enya 15 was given a break-in of 2½ hours. At the end of this time a slight tendency to lose power when hot still persisted and it would appear that a fairly lengthy break-in is necessary with these motors before the continuous operation potential is realized.

The manufacturer's leaflet specifies a fuel containing nitrobenzene in place of the usual nitroparaffin such as nitromethane. This is on account of the difficulty in obtaining the latter in Japan and certain other countries. The Enya runs well using a nitrobenzene additive, but, of course, greater performance is realized with the use of nitromethane as commonly employed in domestic engines. Our final power tests were therefore carried out on a 50/25/25 blend of methanol, castor-oil and nitromethane. The maker's own 2-volt glowplug was used.

Under these conditions, the very useful maximum output of .25 bhp was realized at approximately 13,750 rpm. Maximum torque was just over 20 oz.in. at around 9,000 rpm. Starting was very easy. All tests were carried out with the venturi restrictor in position and it is probable that slightly higher peak horsepower and rpm would be obtained with this removed.

Elfin BR 2.49 (Revised Model)

The first Elfin Diesel, of .11 cu.in. displacement, appeared in 1948 and revolutionized standards of Diesel performance. It was followed by two more outstanding designs: the original radial-mount 2.49 (.15 cu.in.) in 1949 and the 1.49 (.09 cu.in.) in 1950, each of which was the top performer of its displacement group. Two years ago, another entirely new design appeared in the shape of the Elfin BR series. These, fitted with twin ball bearings and reed-valve induction, are a complete breakaway from the previous, shaft-valve, plain-bearing models and, in the BR 1.49

and 1.8 (.09 and .11 cu.in.) models, this breakaway is fully justified by performance unsurpassed by any other motor of similar size in production anywhere in the world at the present time.

The BR 2.49 is a .15 cu.in. model to the same general layout. It first appeared shortly after the BR 1.49 and 1.8 were announced, but it was not entirely successful and the next twelve months or so were spent in developing the improved model now offered.

This model has a bore and stroke of .564 x .600 in., giving a displacement of .150 cu.in. and weighs 5.25 oz. It is a compact motor with a really rugged die-cast crankcase incorporating the main-bearing housing. Bearings consist of one ⅜ in. and one ¼ in. ball journals and support a short full-disk web Nitralloy shaft with crescent counter-balance. The intake is placed centrally in the backplate and can be rotated for any convenient location of the needle-valve stem. Valve reeds are of copper-berrylium, two in number and similar to the Cox Thimbledrome .049 pattern. These are retained by a large diameter compression spring and a snap ring.

The hardened Nitralloy and features screws into the crankcase and features Arden type porting with four radial exhaust ports and four internal bypass flutes. The slide on dural cooling barrel is locked by a screw-on cylinder head cap.

The motor is very easy starting to anyone familiar with Diesels. We found that mere finger-choking was the only preliminary required. Both the needle valve and compression adjustment were responsive and the rearward position of the latter facilitated comfortable handling without the usual risk of nicking the knuckles against the rotating prop. The maximum output obtained was a shade under .23 bhp at 13,300 rpm. Though somewhat less than the peak output of the top class contest .15's and not as high as might be expected in view of the exceptional power/displacement ratio of the BR 1.49/1.8 models, these figures are comparable with those obtainable with the average good .15.

Frog 249 BB Diesel

This engine, the first .15 cu.in. Frog unit of contest performance, has many interesting features. A twin ball bearing, shaft-valve motor, it has a unique synthetic rubber cap over the crankcase nose enclosing the front bearing. This serves the dual purpose of an oil seal and a protection against the ingress of grit and dirt. Two large (⅜ in. i.d.) ball journals are used, supporting a counterbalanced shaft of heat-treated nickel steel.

The cylinder and porting design is, in some respects, reminiscent of the Oliver Tiger. Four radial exhaust ports are employed. These are of moderate area but placed high in the bore, resulting in an exhaust period of exceptionally long duration—approximately 170 degrees of crank angle. A 360 degree bypass passage surrounds the lower section of the cylinder liner with four steeply inclined circular ports into the combustion chamber below and between the exhaust ports. The hardened steel liner is surrounded by a generously dimensioned machine-finned barrel which is topped by a diecast head, the entire assembly being retained by four long screws into the crankcase. The liner is actually clamped at the exhaust flange, thus eliminating any undesirable radial or axial stress. Construction throughout is of excellent quality.

The motor has a bore and stroke of .581 x .574 in., giving a displacement of .152 cu.in., or 2.494 c.c., and weighs 5.75 oz. Featured is a rearwards inclined needle-valve and forward location of the mounting lugs for more balanced support.

Our tests of a stock Frog 249 BB after two hours' break-in revealed an output of .255 bhp at some 14,600 rpm. Handling characteristics were exceptional. The motor bursts into life promptly and remains easy to hand-start even on small props allowing speeds of 15,000 rpm or so—an uncommon quality among Diesels. One essential with the 249 BB is a fuel containing not less than 3% amyl-nitrate or its equivalent, otherwise the motor will miss and spit at high speeds.

Frog 249 BB (Modified)

This motor is a hopped-up version of the model just described and has been produced especially for the U.S. importer. *It is not available in the United Kingdom.* Externally, the motor is virtually identical to the stock model. Principal modifications include a new type cylinder liner, with a specially contoured bypass and increased exhaust port area. The liner is also lowered slightly, shortening the exhaust timing and increasing the effective expansion period while slightly lengthening the sub-piston induction period.

Our tests of this model indicated a marked increase in torque, especially in the region of 11-13,000 rpm and resulted in a maximum power of .280 bhp being delivered at 14,400 rpm. This clearly puts the Modified Frog 249 in the top performance bracket in the International .15 cu.in. class.

Graupner Taifun Super 21

We first had one of these .21 cu.in disk valve German Diesels for test late in 1953. The following year it was fitted to an 11 ft.

span radio-controlled powered glider weighing over 7 lb. Lugging a 12 in. prop, it hauled this model around for flights of upwards of half-an-hour all through the summer. Not bad for an engine only just out of the A class displacement.

The Super-21 is the largest Diesel offered by a U.S. importer. It has a bore and stroke of 16. x 15. mm. (.6575 x .6181 in.) giving a displacemnet of 3.436 c.c. or .2097 cu.in., and weighs 6.7 oz. The power output is in excess of .30 bhp at 12,500/13,000 rpm.

Structurally, this Taifun is soundly engineered and well finished. Diecasting is among the best seen on a foreign engine and the quality of machining is also of a high order. The main casting embodies the housings for the two ball bearings supporting the chrome-nickel steel crankshaft and the backplate, with integral intake mounted centrally above the shaft axis, carries an aluminum rotor which is driven via a dural pin inserted in the crankpin. The cast-iron piston operates in a chrome-nickel liner encased in a dural cooling barrel, the entire assembly being secured by three long screws into lugs on the crankcase casting.

The engine handles nicely and should give the purchaser lengthy and trouble-free service.

The Gang's All Here!

(*Continued from page* 13)

only went on at the flying site, it continued far into the night. Sitting under the stars, on the lawn, at the motel headquarters, groups formed for the nightly bull-sessions. The talk, of course, was of planes and equipment, and any aspect of RC flying anyone cared to bring up. When you have visiting experts group like this, there are plenty of questions and eager listening.

A variety of types of planes and equipment was represented. Tri-Pacers, J-3's, Champions, Cruisers, Beams, were in the majority in every line. The love for scale types was very evident.

Hospitality at the meet was of the true Southern variety. Members of the RCNC group were praised for an exceptionally well run meet. The guests were impressed with the smooth functioning of the entire meet. Especially because of the lack of rigid controls, which, too often, are imposed on participants at meets. Everybody went home happy and relaxed.

Foreign Notes

(*Continued from page* 39)

and handle and can be assembled in a matter of minutes. Like the Firebabies, they are made in both monoplane and biplane versions, with balsa surfaces, hardwood fuselages and metal rudder. Imitation, as they say, is the sincerest form of flattery—and especially when it comes from an organization of the calibre of Schuco.

New Zealand

Unusual new kit scheme is that of the Betta Model Supply Company of New Plymouth, N.Z. (claimed to be the biggest model firm in the southern hemisphere) who make up kits to order from a large selection of magazine plans and other published drawings. Included in the list are two pre-war American design gas models.

Yugoslavia

Twenty-five contestants from six countries took part in the 1956 Criterium of Europe free-flight meet in Yugoslavia and Switzerland, plus four of the Eastern bloc countries: Soviet Russia, Czechoslovakia, Bulgaria and Hungary. Perfect five max scores were returned by Kun of Hungary

and Petuchov of the U.S.S.R. Third spot also went to a Russian (Kucerov) followed by the two noted Yugoslav modelers, Fresl and Zigic. Best Czech place was 6th, best Swiss was 14th and best Bulgarian was 18th.

Japan

New from Japan is a rather unique Diesel .15 of Enya design and manufacture. Unlike pratically all other Diesels in current production, the Enya 15-D has a loop-scavenged cylinder. Other noteworthy features include an unusual piston design with cutaway skirt, bronze bush plus ball-journal shaft bearings and optical twin neeedle-valve assemblies for two-speed control.

Cuba

A fine show for Cuban Army and Air Force brass seems to have been put on by a capable bunch of Havana modelers at Batista Field Cuban AAF base. Not the least entertaining item on the program was junior stunt champion Spencer's performance with a combat model while riding a bike. . . Commented one spectator "Give him, mouth-organ and a tight-rope and you'll pack any theater."

Holland

A new, improved version of the Typhoon 5000-ohm relay described in the February '56 FN is now being made. New unit is more compact, has a balanced armature and is on a square Paxolin base. It retains the adjustable silver contacts and adjustable spring tension of the original model.

Great Britain

Another relay comes from Ripmax of London, noted R/C specialists. This, called the A.40, is a heavy duty secondary or 'slave' unit for use in conjunction with existing receiver/relay combinations. Operating on 1.5 volts and drawing just under 100 mils, it is designed to take care of the heavier demands of certain types of escapements and servos which tend to cause marginal reliability with standard type sensitive relays due to sticking. (The slave relay, interposed between the sensitive relay and the escapement or actuator, is, of course, brought into operation by the receiver relay contacts and its contacts, in turn, close the actuator circuit.) In addition, this 1.5 volt relay suggests many other useful applications. It is available in the U.S., incidentally, through American Telasco.

The Quicker

(*Continued from page* 15)

one, and in this contest, I was disqualified in the finals as a result of a mid-air collision.

Performance-wise, the Quicker is extremely stable and control is positive, yet it turns tight and fast, so be on your toes when you do your first maneuvers. When it comes to tight, fast maneuvers, without loss of speed, this plane will have all you want and maybe more. One thing that I have found wrong with many combat planes is that you have to watch them all the time. However, the Quicker is as stable as any plane that you will fly so you can watch the other plane all you want.

With a K&B Allyn .35 up front one of these planes has unofficially clocked better than 115 mph. However, this was minus the streamer and under good conditions. The average plane will fly between 90 and 105 mph. with streamer. Of course, this will vary with each plane, because of weight, neatness, finish and the performance of the engine. The important thing however is that the plane will keep almost all its speed through all kind of maneuvers. Speed alone won't win combat and

neither will maneuverability. It takes both so combined that the plane will fly through maneuvers about as fast as it will fly level.

I have had best results with a K&B Allyn .35 and a 10x6 Power Prop. This doesn't give quite as much speed as a 9x7 or 9x8, but, in my opinion, the faster acceleration and more constant speed in maneuvers more than make up the difference. I would suggest that you try different props and find the one best suited to your locality.

Begin construction by trimming the 1" square, medium hard, leading edge to the shape shown on the side view of the plans. The preliminary shape can most easily be obtained with a bench saw, but if you don't have access to one, it can be done quickly with a wood plane or knife. Then it will only take a minute to get the final shape with sandpaper. When you have finished the leading edge, cut W-1 and W-2 from ⅛" Plywood and cement them in place on the leading and trailing edges. Remember that the inboard wing is 1¼" longer than the outboard wing.

Make up the 15 ribs as required and slide them into position on the ¼" spar. Note that the spar is below the center line of the ribs so make sure that you don't put any ribs on upside down.

Cut the leading and trailing edges out to match the cutouts in W-1 and W-2 and then cut out the notches for the ribs. This is most easily done with a Zona or X-acto saw. Cement the ribs in position and aline the wing over the plans. Do not cement the two ⅛" ribs at this time. Set the wing aside and cut the two motor mount crutches from ⅜" x ½" gum or maple. When the wing is dry, cement the motor mount crutches in place. These bearers run full length, slimmed out as shown on the top view. Use a good, penetrating glue for this operation. I have had very good luck with Elmers Glue-All. Now cement the ⅛" ribs in place against the motor mounts.

Cut the stabilizer, elevator and rudder from ⅛" sheet and sand them to shape. Be sure to use firm, hard balsa for the stabilizer. Install the control horn and hinge the stabilizer and elevator together with linen hinges.

Push the 1/32" wire tank hooks through between the center ribs and the motor mounts and double cement the entire wing and motor mount structure. Cement the ⅛" plywood bellcrank mount and the ¼" balsa wing tips in place and install the lead weight in the outboard tip. Cut holes in the ribs for the leadouts and install the bellcrank, leadout guides and leadouts. Install the 1/16" pushrod in the center hole in the bellcrank. Notice that there is a pushrod guide hole provided in W-2.

Cement the stabilizer in place and finish the control hook-up. There should be no more than 30 degrees elevator movement in either direction. Check the controls for freedom and smoothness as this is a must for combat flying.

Cement the ⅛" balsa filler block between the motor mounts and plank the fuselage and wing center section with 1/16" sheet balsa. Install the rudder with about five degrees offset. Now sand the entire model with fine sandpaper and cover it with your favorite material. Drill the motor mount holes, giving the engine about five degrees of offset.

I finish the wood surfaces of my planes with one coat of sanding sealer and two or three coats of clear or transparent dope with light sanding between coats. Put just enough clear dope on the wing to give a smooth, fuel-proof surface. Take it easy when doping the model because a lot of weight can be gained here, especially if you use colored dope. Use a few drops of castor oil in the clear dope to prevent over tightening of the covering material and to help prevent warps.

Any commercial tank can be used by

taking the bottom vent out and covering the hole with a tin plate. Hold the nose of the plane up and fill the tank through the fuel intake tube. I turn the vents of my tanks into the air stream. This gives a constant air pressure on the fuel and gives a more constant motor run through the entire flight.

These planes have been flown in sand-storms here in West Texas so if you are an experienced flier, don't wait for a calm day to test fly. On your first take-offs hold the elevator in neutral and have your helper launch the plane with the nose up about 10 degrees. Once you get the feel of the plane, the method of launching won't make any difference, VTO if you want to.

Now that you have this plane as your chopper go to the next contest and show your opponents that you can cut the most streamer, Quicker!

PAAckhorse

(*Continued from page* 10)

the only offset on the entire ship. The flight pattern will be a straight climb with a smooth transition into a right glide circle.

Proper adjustment of the landing gear is essential for good take-offs. Push the model on the ground to see that it "tracks" straight. A slight degree of tow-out is permissible and even recommended but any degree of tow-in will cause a wing to drag on take-off. Don't bother to put the prop on backwards for first tests. In fact, nearly full power is OK right from the start.

The PAAckhorse performance on the allowed 20 sec. engine run should give you a better than ever chance of bringing home some of PAA's prizes.

Airnocker

(*Continued from page 20*)

to scale construction than the common flat sheet-balsa tip. Remember to wax the form block so you can remove the tip bows when dry.

The tail surfaces require no explanation but don't omit the little triangular gussets shown. They prevent the corner wrinkles which appear so often on covering and doping flat tail surfaces.

The fuselage is basically a straight forward box. The two sides are built up, one above the other, in the interests of similarity, on the plans. The left and right side can be exactly alike unless you want to make a working door. The door is on the right side of the fuselage only, and is indicated by the phantom (–..–) line. If you intend to make a door, fill in the right hand frame with 3/16 sheet back to the front of the back window; 3/16 square balsa is used for all the basic structure. After all the cross braces are in, build up the wing center section. Eight center-section root ribs are required from ⅛ sheet. Four are laminated together for each side. The forward ends are rounded off as shown in the top view to form the windshield outline. Carve a trailing edge section and cement it to the fuselage frame, then add the root ribs. The wing box is made from 1/16 plywood. It should be a good fit in the slots in the root ribs. The center section is probably the most difficult part of the model but studying the plans and a little patience make it not too hard.

After the center section is on, cut out and cement the formers in place. Next, add the planking aft of the firewall to the front of the landing gear. The side planking of ⅛ sheet must be carved after installation to the contour shown in the fuselage section looking forward. Now add the 1/16 by ⅛ hard-balsa stringers.

The main landing gear is bent from 1/16 diameter music wire. It should be cemented to the frame and wrapped with thread at the four bends that contact the frame. The 1/32 diameter cross wire is bent to shape and soldered to the main landing gear wire. The tail wheel wire is made from 1/16 diameter music wire and cemented and sewed to the fuselage framework. The fairing for the main gear is made from ⅛ sheet balsa.

The motor mount installation shown is made from plywood. Weldwood glue is recommended for this job because it is not affected by fuel and is very strong. Cut the firewall, two sidepieces, and the top piece of the motor mount from 1/16 plywood. The front piece to the motor mount is made from ⅛ plywood. Glue these together as shown on the plans. If you are using some engine other than the Mac diesel shown, be sure to check and see that the motor mount as shown will work. If not, you will have to modify the side and top pieces of the box. Cement the firewall to the front of the basic fuselage.

The cowling on the original model was made from fibreglass. This material makes an exceptionally strong and abrasion resistant cowl. A solid-balsa cowl is carved and finished to a very good polished surface. Then, a plaster mold is made. The fibreglass cowl is then made up inside the plaster mold. Advice on the exact procedure to be followed can be obtained at the same place that the glass cloth and resin can be purchased.

If you don't want to tackle the fibreglass cowl, simply hollow out the solid balsa cowl to clear the engine installation and use it.

The fuel tank that was used on the original model was made of celluloid ce-

mented together with model airplane cement. This will work fine with a diesel but if you plan to use a glow-plug engine, either solder one up out of brass shim stock or buy a small commercial tank. The filler line to the tank was arranged to stick out one of the cooling air inlets in the cowl. Therefore, the only out-of-scale hole in the cowl was for the needle valve. If your engine can be made to operate without adjusting the needle valve, turn the motor over and face the needle valve down eliminating even this hole.

Standard model procedures can be used for covering the model. The original was covered with Silkspan, given three coats of clear dope, two spray coats of silver, then three coats of orange-yellow dope, then the orange belly trim and numerals were added. The orange was made by mixing approximately 50/50 parts of insignia red and the yellow.

The movable surfaces were attached with soft iron wire as hinging material. The struts are made as shown on the plans. Although the wire leading edge is somewhat heavier than usual, it saves a lot of broken struts on the field and is felt to be worthwhile. The upper ends of the struts slide into aluminum tubing sockets which are cemented to the wing at the points indicated by X's on the wing plans. The bottom of the struts hooks into a wire loop that is attached to the fuselage structure. See the strut fitting details on the plans. Add thread bracing for the tail to simulate the wire bracing of the original airplane.

The windows are made from 1/32 thick plastic sheet and care should be taken not to smear them with cement when attaching them to the airplane.

If you want a seaplane version, build the floats as shown on the plans. These are made of sheet balsa and must be thoroughly waterproofed. An aluminum tube will be required in the fuselage to take the aft brace wire for the pontoons. This wire is silked to the pontoons as shown on the plans. The front support block fits around the wheel hubs and is attached with rubber bands.

If you want to build only the seaplane version, the author would suggest one change to the model. With the pontoons in place, less dihedral is required. In windy conditions, less dihedral would be helpful while on the water, to cut down on the normal overturning tendency when taxiing cross-wind.

A short trip to the airport will supply you super scale fans all the details that you want. And if the longerons sag on your model because the covering is too tight, take a camera along and substantiate

the sag with a photograph. Almost all the real ships sag too.

FLYING

Make sure there are no warps in the model before you leave home. Make sure the engine runs. Try it the night before. Unless you have some good tall grass, make your first flights ROG. Otherwise check the glide with some hand-launched flights. It should glide flat and fairly slow. The elevators can be used for trim. Adjust the rudder for a wide (almost straight) right turn.

Now try some low power ROG flights. Any drastic turning tendency will show up before the model is airborne. If there is a turning tendency, correct it. Gradually, increase the power until the airplane climbs out. It should climb almost straight out and glide in right circles. A slight left turn under power is satisfactory.

Catalina Crossing

(*Continued from page* 36)

boat, once coming to about 5 feet of the model, then vanished for more appetizing fare. From 11:15 to 11:45 the ocean was like glass and the model boat really started to plane. The rpm on the pilot boat got up to 1700 rpm—about 13 miles an hour. About 12:10 boat started slowing up very fast to about 900 rpm. At 12:22 P.M. we made Bird Rock, Catalina, about 21 miles from San Pedro to Catalina Island.

We entered the Cove and then came out again. The skipper suggested we should try to make Avalon, about 12 miles away, but the model ran out of gas after 6 hours total time three miles from Avalon harbor. We lifted the model on board the pilot boat and headed home, tired but very happy.

Everything worked very well, motor fuel, transmitter, receiver, escapement and batteries. If we could have carried more fuel I think we could run forever.

The name of the boat is Big Smoothie; skipper and builder, Bob Gregory; pilot boat skipper, Al Kibler. Pilot boat's name—Don't Sink, a 22-foot cruiser.

Model boat specifications; length, 6 ft. 9 in.; beam 24 in.; monohedron hull, fiberglass covered. Colors: red water line, white hull, air scoops blue with designs. Power was an Anderson Spitfire .65, water-cooled; flywheel weighed one pound; Champion glow plug; propeller 2½".

An E.D. motor-driven escapement was used. Fuel was K & B 100; 8 quart-cans fed into one duct. Batteries: one—1½ volts, two—67½ volts, two—7½ volts, two—4½ volts. Radio was a Citizen-Ship "Rex" Dual Transmitter-Receiver.

Hull construction: 12 bulkheads made of ¼ in. marine plywood; oak keel, 4 longeron stringers of ½ in. by ¾, ¼ in. balsa sheeted; fiber-glass covered (commercial cloth), using three quarts of fiber glass filler, and enamel paint for final finish.

The motor is completely water cooled. Water is picked up from scoop in back of the propeller, then is fed through the motor, then goes to a tee, where one-half goes out of left side of boat, and the other half goes into the exhaust pipe. All working parts made to operate as simply as possible.

This boat was made for the channel run, without fancy construction. It is a functional design intended for this special purpose. All parts as low as possible in hull. There are three scoops, two for air and one for carburetor intake.

For rough water going the boat must be guarded against swamping—any water splashed on the receiver would make it inoperative. The removable cockpit cover seals the contents of the hull.

The Long Project

(*Continued from page* 18)

cause by the very nature of slope soaring a model hits steep country hard. I watched seagulls as I had never watched them before, and observed that at times they soared low along the exact line of the crest with every bird following exactly the same flight path, yet a few minutes later these same birds would be soaring hundreds of feet up with strong lift evident over the whole area. I saw gulls below crest level flapping along at the same time as those above crest level were gaining height soaring. I worked out the technique of hand launching as hard as I could throw, straight into wind off the crest, with turn on such that the model would turn out of the stall and hold the vital 20 or 30 feet gained. Slope soaring proved bitterly cold. I wrapped up in an old duffle coat even in summer. It was a great shock to my free-flight soul to go about eyeing the country for the steepest and most exposed and windiest ridge for a place to fly. Through all this time of disappointment and failure there were many occasions when I would have given up if it had not been for the memory of that first flight—which had soared away so well, I now realize, solely because the valley had been emptying itself of a big thermal bubble and this had been the key to the first 100 feet of altitude.

Experience accumulated until I was able to pick those conditions under which a clean launch and sustained flight could be expected. On Jan. 7th, '53 a group of friends gathered and we flew the glider for 1 hr. 9 mins. and landed it deliberately. The current FAI R/C power record was then 40 mins., and no glider record had been established. The object of that flight was to prove the paper channel between New Zealand and FAI. A record claim was put in.

The N.Z. Model Aeronautical Assn. is affiliated to the Royal N.Z. Aero Club, which is affiliated to FAI. The flight was accepted as an NZ record, and forwarded to FAI on my behalf. In no time at all FAI approval came back, followed in due course by the formal "Diplome de Record." It was as simple as that.

Any project which, from the outset, envisaged durations of 8 hours or more was clearly going to run into trouble over the matter of officials. The NZMAA is an old established body (early 1920's) and their rules are as strict as any in the world. It is required that two senior affiliated members be present throughout any record flight, one to time and the other as witness. My work as a trans-ocean airline captain knows no weekends, and the probability of my being free on any day when the weather would be suitable for an attempt, and at that time being able to talk two friends into devoting virtually their entire day towards helping me on what would be on most occasions yet another unsuccessful endeavor, looked remote. I perused the FAI code sportif, and asked the Council of the NZMAA to consider the problem and advise me if any alleviation were possible. They were most cooperative. A strict reading of the code sportif indicates that an endurance record must hang on the testimony of one timekeeper—"an official appointed by the National Aero Club"—and that the various other officials need not be present throughout the entire flight. (Consider, for example, the case of a model being followed by a timekeeper in a light aircraft.) The NZMAA ruled that in the case of a notified project which was continually under observation by their

officials, the testimony of one senior affiliated timekeeper would be held to comply with FAI, provided that the launch was witnessed and the flight in all other respects complied with the stricter NZ rules. They also ruled that small movements of the transmitter, essential to the operation of the flight, were considered permissible within rule; "The transmitter shall not be moved during flight." This was in response to two specific problems. I have often used the runway of an airfield for take-off in an attempt with the power model. Once airborne, it is mandatory that I quit that runway! And cliff soaring has hazards enough without trying to land the model right on the brink. If a model has been held under control for several hours, it is clear that a small movement to some nearby vantage point, for the purpose of a better and more feasible approach, should not be held to invalidate the concept of control.

The glider was by now thoroughly "shocked." It was stripped and re-glued, and fitted with a tow-hook. It surprised us. Delightful to tow in a breeze, it carried 700 feet of 14 lb. nylon right overhead. As we learned to handle it better in the pleasant flying over a smooth airfield, we realized that to tow-launch the start of a slope-soaring flight would be practical and would eliminate entirely the critical hand-launch. So it has proved except for occasional trouble with severe turbulence behind the crest. In the next few months we tried twice to exceed the hour, but the model blew away backwards once at 51 mins., and again at 63 mins. There was no room inside that model to fit a second control for elevator, so, as the power model was by then causing enough trouble, the glider was relegated to fun only.

The radio had never missed a beat. And there we can leave the glider project meantime.

In designing the power model, I envisaged use of 2-control radio gear such that the model could be both turned and controlled in altitude. By FAI definition a model must weigh no more than 5 kilograms, or 11¼ lbs. Radio gear would weigh 1¼ lbs. which left 10 lbs. to be split between airframe and fuel. Throttle, to permit controlled descent under power, was desired, and with these thoughts in mind many likely motors were tested. The ideal motor would be reliable, have a low specific fuel consumption, and be easily throttled.

Spark ignition burned little fuel and throttled well, but I could find no way to prevent plug fouling during prolonged idling. Exit spark. Glow motors were reliable, and throttled beautifully, but they burned so much fuel as to compromise the whole idea of long duration. Exit glow. Diesels seemed reliable and burned little fuel. Tests began to concentrate on the Mills 1.3 cc. It would run indefinitely using about 3.3 ozs./hrs., but, set like that, it would not idle. With compression backed off and mixture enriched it would run just as well, and idle well too, but at a consumption of 6 to 7 ozs./hr. Exit idling. The concept changed to a model running at constant power using elevator trim control to shallow dive to reduce altitude.

Power available would be about .075 hp., and thrust at a flying speed of 25 ft. per sec. would be 10 to 12 ozs. assuming a prop efficiency of 40%. As this design, too, would follow the proportions of my well investigated A2, I was able to be reasonably certain of what could be done

with 10 ozs. of thrust. The A2 developed a Lift/Drag ratio of 12.5/1. I believed that, by keeping the power model as clean as possible, in particular tolerating no undercarriage drag, it could be designed to develop at least 10/1 L/D. Thus with 10 ozs. thrust it should fly at 100 ozs. or better. I aimed for a 30 oz. frame, 20 ozs. of radio, and 50 ozs. of fuel, and built power model Mark 1. Span was 116", chord 12.5", area 1400 sq. ins. Fuel was stored in a long plastic bag running spanwise between the front and rear wing spars, and fed by gravity to a float chamber near the motor. This model was built to its design weight, and flight characteristics were most promising so far as ultimate performance was concerned; but excessive flexure of the tail booms under elevator down-load was at first frightening and shortly thereafter disastrous. (Editor—This model had a built-up pod-type fuselage terminating behind the trailing edge, and two long, slim booms extending from under the wing, on either side, back to the tail, the stabilizer being set atop the two vertical fins.) The faster the model flew, the further back the center of pressure moved, and the greater became the down-load required from the elevator. This down-load bent the booms further down and made the elevator more positive, thus merely aggravated the dive. It was realized at the same time that the method of fuel storage was unsound as it would split the wing wide open whenever the model took a bump on the wing tip. The concept was revised to a conventional layout, housing the fuel within the fuselage under the wing. The motor remained a pusher, partly to avoid slipstream drag, but mainly to avoid the drag of a long undercarriage. Main problem now was fuel storage and feed to the header tank.

Experiments with glorified Jim Walker tanks of plastic or rubber which held 50 ozs. always eventually leaked or burst. Finally, I decided that can manufacturers knew most answers about storing liquids, and I soldered two 4" tin cans end to end. This tank, 4" dia. and 9" long, weighs nearly 8 ozs. but it has never leaked nor burst. Fuel feed is by pressure. A stud drilled with an 80 gauge hole tapped into the Mills crankcase delivers pressure enough to force fuel up 16", and does not affect running.

The engine has its contra-piston tightened by punching while in position. It is mounted on a rigid dural and balsa spar which is itself spring-mounted to the fuselage. The whole assembly balances almost at the crankshaft. The motor runs sweetly and smoothly with negligible vibration passing through the springs to the fuselage. The header tank is very lightly spring-mounted to the motor, such that fuel lies quiescent while the motor is running. The float is a piece of ¼" balsa dipped several times in auto lacquer. The float valve is a pin-head. Filters are tiny discs of filter gauze thrust into fuel tubing with a match-stick. The whole system is simple and visible, and it works.

Various fail-safe devices were considered, and an Aneroid capsule was adapted to cut off fuel above 1000 feet, but it proved impractical. None have been used.

Radio gear was initially a standard receiver operating a Bonner-type escapement direct; the third position, when held, made a series contact which reversed the elevator relaytor setting. While this control operated satisfactorily enough, I found it clumsy and unhandy to use when in any trouble, and later changed it to "quick-

snap." Relaytor power was a 10-foot length of ¼ by 1/24th rubber which I wound with 4,000 turns maximum.

Weight had by now risen to 77 ozs. without fuel. Flight and ROG at this weight were encouraging. Fuel was added 10 ozs. at a time, and the prop was cropped and tailored as seemed best as the load increased. A perfectly balanced 9" by 4", of reasonable blade area at the tips, thinned paper thin at the tips and highly polished, proved best. At 110 ozs. the wheels flattened sideways under the load and had to be replaced with stronger ones, after which the model proved capable of consistent take-off and climb with the tank full at an all-up weight of 125 ozs. It would without doubt ROG at greater weight, but it is my practice to trim to use the excess power to give more speed, for the model flies woefully slow.

Polite skepticism has been inferred in some overseas magazines at the report of ROG's at this weight with only a .08 cu. in. diesel for power. Given a free-rolling undercarriage directly under the C.G., and unlimited hard, smooth runway to accelerate over, take-off is not a problem. In theory at least a wing close to the ground is more efficient than one in free flight, and thus it should be possible to ROG at a weight at which the model would be unable to climb away. In practice this model accelerates very slowly, waddling for the first ten seconds, and a still air take-off uses up to 200 yards of runway and flat airfield in plenty thereafter, for the angle of climb is almost zero.

So much for the model. In order to fly it seriously a day has to be picked in advance during which the wind is unlikely to exceed ten mph, and the necessary officials must be persuaded to come to time and witness the take-off, which is best made about dawn to take advantage of the morning calm.

At this point I must introduce Don Wilson, a quiet and talented civil engineer. Top line with Wakefields, and a brilliant performer with a hot stunt ship at the end of the lines (something I could never master), Don now builds flawless and imaginative radio models and flies them hard and well. From this point on, this story tells how Don and I, as a team, have worked to turn theoretical possibility into witnessed durations.

(To be Continued)

More About Stunt Theory

(*Continued from page* 23)

of air over the stabilizer, called downwash. This is roughly 5 Cl or for a Cl of 1 the downwash will be 5°. This downwash, shown in Figure 3, will make the stab more negative. With flaps there doesn't seem to be much information on downwash, but we suspect it is greater. Downwash must then be used to calculate stabilizer motions. To predict area we'll assume some constants, and add that a stab airfoil due to small chord and detrimental airflow characteristics will stall at around 6.5° and operate at 75% efficiency. Armed with our data on the average ship with a 16 in. tail moment arm and no flap we get this: See Figure 4.

Equating WF to SF we find:

$$A = \frac{165}{8.73} = 19$$

$$\text{or } A = \frac{19}{.75} = 25 \text{ sq. in.}$$

For this set-up we will need 10° deflection of our stab. Notice the extremely small stab here compared to our tremendous combination stab and elevators. In case any of you got lost in our math, we tossed out things that appear in both sides of the equation. Reason for small stab is a real sensitive trim. If we balance at 10%, our area would be 65 sq. in. See how important the old CG location is. We have been working with maximum lift on both wing and stab. If the stab is forced into a more negative angle, it will stall and lose down-load. We have then reached our minimum loop diameter and will probably open up a little. Ever have this happen to you? It is not the fault of the wing at all. Normal practice is to stay away from the 6° angle on the stab, but only work it 4.5°. We then have the ability to stall the wing, but at least we know what's doing it.

You'll notice we worked on a smooth turn in our last go-round. Will this stab be good enough for a square turn or our old 5-foot radius? We did some mathematical playing around and found out it will. If we assume our wing can suddenly lift enough by virtue of flat-plate pressure increase, even though it's stalled, our present stab is quite capable of doing the job. The sharp turn depends on an abrupt overcontrolling action rather than smooth increase. We more or less kick our wing loose from its normal attitude and the whole works goes ape. The loss of speed helps too. Anyhow, mathematically and practically, the stab from the above calculation is alright in a square turn.

As for the standard set up of elevator and stab, they don't appear too efficient. We cannot accurately predict their action since at small angles they work as cambered airfoils and at larger angles as part wing and part deflection plate. We therefore must always make them too big. With flaps, our center of lift moves aft when depressed, which means our elevator must be larger than without flaps. So we fall back on an experimental value of 25% of the wing area and using an elevator chord equal to stab chord. Structurally the stab-elevator is simpler to build, while the problem of bearings and linkage make the stabilator or flying tail more difficult. Having tried one flying tail, we found that it is indeed much more effective than the conventional setup.

For those who are interested in using a stabilator, would suggest pivot point on 25% chord so we have an aerodynamically balanced surface. Use a downwash of say 6 C1 for a flapped wing. Angular difference will tell you how far to move it both ways from zero. On stab-elevators we've found it best to limit motion to 30° and to adjust CG from test flights for best turns. More motion causes excessive drag, hastens the stall of both surfaces and results in large variations in speed during maneuvers. The author has made close observations of elevator motion in flight and has found that rarely does the elevator exceed 20° on ships which are trimmed properly. Those which do, perform stalled maneuvers which are sloppy and definitely not desirable in stunt.

In considering wing shape we want to get the most work for a given area and still be able to get it into an automobile. This limits us to about 54 inch spans, unless you own a station wagon or hearse. The constant-chord wing gives us the largest wing area for a given set of dimensions, but the losses at the tip plus the tendency to wobble laterally make it undesirable. The tapered wing takes more work in design stages and building, while giving fairly good results in action. The elliptical shape is the ultimate in efficiency, and can be built up by using a few tricks to simplify layout and construction.

It has proved best to maintain the flap hinges on a straight line for maximum smoothness of operation. although slight angles can be used if the flaps are connected with speedometer cable. Good material has already been presented on structures so we will only say we prefer the "D" tube leading edge because it gives a smooth section. The profile or the airfoil section is important, but not too important. The author spent much time plotting airfoils the hard way, and comparing them to zip airfoils. We learned a few things. When drawing up a flapped wing the airfoil should be considered without flap, leaving the trailing edge thick enough to support the flap. Our own airfoils have the maximum thickness at 35% and use a medium leading edge radius. A sharp-pointed leading edge will stall very gradually, but at a lower angle of attack than a blunt leading edge. The blunt airfoil will stall at a greater angle of attack, hence giving more maximum lift, but it stalls very sharply or sudden-like, which leads to surprise landings at three-foot altitudes and such. Therefore, the medium radius.

If you like to plot airfoils, the NACA four-digit streamlines are quite satisfactory. The NACA report No. 824 has a lot of interesting dope for those of your who want to delve deeper into this subject. We would recommend plotting a few airfoils to get used to their characteristics and then branching out and playing around. It's more fun that way.

We've worked over the CG location pretty thoroughly already, but want to remind everyone that it's important. Much has been said pro and con about moment arms, long and short. Either can be made to work well if the CG is located properly and the stabilizer is of proper size to do its job. When starting a design from scratch, the CG location must be assumed in order to have something to base figures on. It must then be built into the model with a minimum of ballast which is only dead weight. In general, the long nose moment arm helps here. Weight in the aft end of the model must be kept at a minimum and structure should be carefully designed for lightness as well as strength. Stabilizer and elevator should be

built-up rather than solid; on the larger ship, at least. If using sheet balsa keep thickness between 3/16" and 5/16" and use light medium-grain wood. Use "C grain wood if possible.

Watch your painting technique, being careful not to get the rear end heavy while finishing. Finish your model completely before flying. Most of your dope is added behind the center of lift, so your CG is moved back. This happened to us once, with disastrous results. Experience alone will better your technique for building the CG into the proper location. But do not be afraid to add weight if it becomes necessary. Most of our modern stunt ships are too light anyhow. Think about that one for awhile.

With U-Control we need tight lines to maintain control. There are several ways to guarantee ourselves enough tug at all times. Most important means, which we have never seen discussed as such, is the leadout location on the wing tip. Some designers seem to feel it's the bellcrank location. Not so. The CG will, like a plumb bob, try to aline itself along the line of centrifugal force, or on a radius of the circle. The center point of the leadouts becomes the pivot point. Therefore, as long as the CG is ahead of the theoretical pivot, as per Figure 5, the ship will yaw outward and give us our tug. As a formula we locate our bellcrank ¼ of the way from the leading edge and slope the lines aft 5°. This assures a nose-out yaw. You could theoretically locate your bellcrank anywhere and not change the yaw angle, unless real stiff wire is used. Cables have proved to be best anyhow. The speed boys are finding that leadouts in line with CG give more speed, from decreased or zero yaw.

While we are in this yawed attitude our fuselage is developing lift in the same direction as our centrifugal force which aids our tug. Be careful of this however, because, if excessive, it will cause wobbly turns and otherwise sloppy flying characteristics. If you plan to fly a slow ship on lines longer than 70 feet, increase the sweep back of the lines, since the natural bow in the lines will be greater. To get a rough idea of how your present ship yaws in flight hold it up by the leadouts; with a good tight grip, naturally, and observe the angle. It is expedient to bring the leadouts through the tip fairly close together, less than one inch apart. This decreases the tendency of the ship to change yaw angle as the load is shifted from one line to the other.

Tug is affected by the bank angle of

(*Continued on page* 58)

the ship. If banked into the circle, tug will be less, since the lift is no longer vertical but into the circle. If outboard wing rides low, the tug is increased in a like manner. The vertical CG location has a pronounced effect on the bank angle, so some thought should be given to layout of the side view. The low wing setup has proved to be the best compromise on this point. The landing gear balances the upper structure bringing the CG down around the wing for a fairly neutral setup. This presumes the leadouts are brought through the wing. We built one combat ship with everything above and below the center line balanced; and the engine laid on its side. This ship flew perfectly level laterally and was real nice to handle. Engine offset is very effective in controlling tug, particularly in overhead eights. Three degrees has been found the best compromise for this. You will always have your pure centrifugal force in level flight, but the effect is decreased as you climb on the circle. The forces and analysis of same are greatly complicated in control line due to operating in a hemispherical flight path. For the most part, detailed analysis proves little. •

Next month we'll prove plenty and get this show all wound up.

Hornisse Wakefield Winner

(*Continued from page 28*)

—ply in mm thickness, for example, the plan shown here has been converted to easy-to-obtain materials in our hobby shops. No really important changes have been made, substitutions being in the smaller details. Believing that the Wakefield student is an expert builder, the drawn-out step-by-step construction has been eliminated, but any essential comments follow below.)

The propeller is made of medium balsa of 12 grams per cubic foot, specific weight. The block is cut out with all surfaces at right angles and is drilled in the center. The backs of the prop blades are sanded flat from edge to edge. Camber is sanded in according to plan; it is important that the highest part of the camber be towards the rear of the blade section. Not until this is done will the blades be shaped. Only a minimum of twisting of the thin blades is allowed in order to maintain the pitch. Under no circumstances blades should exceed the given thickness, or else the total weight of 6 grams for the prop will be exceeded. One layer of thin tissue is applied to the end of the blades and

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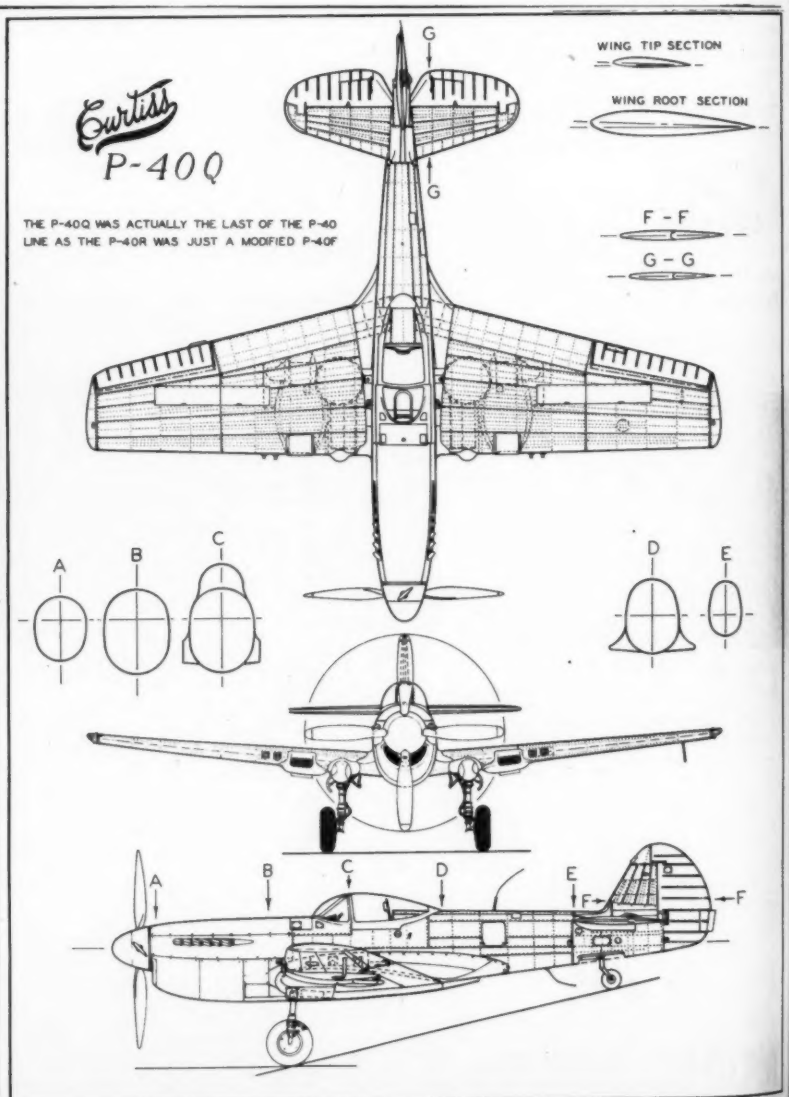

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given a coat of clear dope to prevent splitting. For strength the prop is given a further 5-6 coats of clear dope. After every coat, except the final one, smooth down blades with very fine sandpaper. Use a very fine fretsaw blade to cut off the blades in order to make the folding arrangement. Side view of the cut should appear wedge shaped. Cut faces are coated with cement to increase surface hardness. Covering is light Japanese tissue of about 12 grams specific weight per square meter. After covering with tissue, 3 coats of thinned banana oil was applied to the original model. The motor consists of 14 strands ¼ x 1/24" Dunlop or Pirelli rubber. A safe lubricant is a mixture of ⅔ soft green soap, ⅓ castor oil and a few additional drops of glycerine (try the drugstore).

Testing should be done in calm weather. Begin with glides, the model being launched against the wind in the same manner as gliders. The glide should be at a low angle. Trimming of the model is done by fixing small weights to either front or back of the model as necessary. Position of wing and tailplane must be according to plan. When the glide is satisfactory, the first rubber-driven flights can be made. For a start, the motor should not be given full turns. Both powered flying and glide should be in right-hand circles. To compensate the side thrust and to achieve a right-hand circle in the glide, too, mounting of the wing should be slightly out of right angles with the fuselage. Adjust sidethrust and downthrust by small balsa scrap packings. Power flight with maximum motor turns is almost vertical in the beginning, later changing to wide righthand circles. Power run with maximum turns is approximately 65 sec. The dethermalizer is of conventional type, fixed at rear of tailplane.

Radio Control News

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merely keying once or twice. If a third pulse is given, an electrical contact is made which can be used to operate additional actuators, or, the unit may be hooked up mechanically to give up-elevator. By a simple change in the contact, this unit will provide engine control, rudder, and the one elevator position. The price is $8.95. The Bonner Compound escapement, the first "Compound" on the market, gives the same control rudder functions as the Babcock unit and has the electrical contact third position to work an auxiliary actuator. The Citizen-Ship SE escapement, selling for $7.95, gives left and right control and like the others is self-neutralizing. Berkeley Models Inc., West Hempstead, New York, put on the market during the latter part of 1956, a compound-type escapement which sells for $5.95. We have not yet had an opportunity to test this unit. In addition to these standard compound-type escapements, Bonner markets a new unit called the VariComp. This $8.95 combination gives left, right, up, down and engine control. Two or more VariComps can be installed as a "cascaded" system to give rudder, up- and down-elevator, and engine. The transmitter is keyed three times for up, four for down. The system is self-neutralizing from all positions.

The next step-up in compound type escapements is the ECCO Multi-Compound, produced by Ectron Products Co., Smyrna, Georgia. The novel feature of this unit, which gives full rudder, elevator and engine control, is the Rapidtrol Stick Box. The escapement sells for $11.95 and the compact control box is $13.95. This control box allows you to operate the controls in your plane from a stick on the box and automatic synchronization is obtainable at all times.

In addition to the described rubber-powered actuators, several companies produce electric motor-driven and magnetic actuators. The most popular of the electric motor-driven types is the deBolt Servo, made in a wide range of models for almost every purpose. These servos operate on 1½ volts and use current only in going from one position to another. Plenty of power for the largest models, and a design for practically every control function, make these servos the leader in their particular field. Prices start at $10.95.

The next type of motor-driven servo gives control in two directions and operates only when a signal is present. This type is generally used for control trim work, actuating flaps or gears and for elevator control. Such units are made by Babcock, Bonner, deBolt, Schmidt, and others.

The Babcock Servo-Motor is written up under New Items this month. The Bonner motor servo is very similar, except being slightly longer. The deBolt and Schmidt have nylon gears. The newest advancement in motor-driven servos is the Robot Synchro, made by Valley Electronics, Vestal, N. Y. This unit is written up this month under New Items. An advanced type of actuator, we believe the Robot Synchro will get into a lot of installations this year. The price is $14.95.

There have been several magnetic actuators on the market and the one which has survived the test of time is the Southwestern Actuator. This $5.95 unit is sold by Ace Radio Control, Polk's Modelcraft Hobbies, and others. Measuring about 1" x 1" x 1½", this actuator requires a pulsed signal and requires from 3 to 6 volts for power. Left or right control, in varying degrees, may be obtained by varying the length of the transmitted pulse.

In addition to the receiver, transmitter and actuators, there are a number of accessories and helpful gadgets to make RC easier. Several receiver kits on the market are supplied without relays, if you so desire. Our choice for relays includes the old standby, the reliable Sigma 4F, shown in photo. An 8,000-ohm coil, adjustable contacts and armature tension, and low current for operation, have sold more relays of this type for RC use than any other. Weight is 2¼ ounces and the relay is available at most hobby dealers and radio supply houses. Another Sigma relay which is excellent when low operating currents are used and utmost reliability is required, is the Sigma 26F. This is also available from most dealers. The Sigma 4F sells for $7.00 and the 26F is $8.50. In the lightweight relay field, the GEM relay is currently at the top of the list. The 5,000-ohm model selling for $4.95 and the 7,500-ohm model for $5.95. The Babcock BR-3 relay is small and light weight. Good sensitivity and heavy points are the main features of this $4.95 relay. Another lightweight relay which is well established in the model RC field is the Kurman 5,000-ohm unit. Selling for $7.50, this relay weighs less than 2 ounces, has adjustable contact points and good sensitivity.

In addition to relays there are special RC fuel tanks, meters, batteries, switches, and other components. There are many sources for these parts. Ace Radio Control, Higginsville, Mo.; Polk's Modelcraft Hobbies, N.Y.C.; ESSCO, 57 Walker Street, N.Y.C.; Gyro Electronics, 325 Canal Street, N.Y.C.; and Lafayette Radio, 100 Sixth Avenue, N.Y.C. to name a few.

(*Continued on page* 62)

HISTORIC AIRPLANES

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The Curtiss Hawk "P-6E" is one of the great historical models of the Air Force. It was our best pursuit ship of the early 1930's. Berkeley's model is authentic, scaled without deviation from rare service manuals supplied to us by the Air Force Technical Museum. The complete decals for the famous "17th Pursuit Squadron" from Selfridge Field, Mich. make it a really beautiful model to own and fly.

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Features retractable-extensible landing gear, throttle, flap, elevator and rudder control.

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(Redesignated P-51 in 1947) Over 15,000 Mustangs were built in World War II. Most widely used version was the P-51 "D". This airplane probably saw more combat than any other design in history. Still flying with reserve units and friendly foreign Air Forces. Powered by 1,490 h.p. Packard, Rolls Royce Merlin or 1,300 h.p. Allison. Armament was six .50 caliber machine guns. Maximum speed 437 m.p.h.

as one of the fastest climbing
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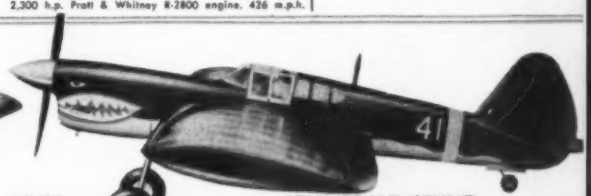

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SEMI-SCALE STUNT

"P-40 WARHAWK"

For .19 to .36 Engines — 45" Wingspan

This beautiful semi-scale stunt controline won first in Open and first in Senior at the Tangerine Internationals. Die-cut balsa; silk-screened celluloid canopy; complete metal hardware including Jim Walker "U-Control"; metal cowl; fuelproof Flying Tiger decals; stunt flaps.

SCALE STUNT

GRUMMAN "GUARDIAN"

ed as a Torpedo bomber, the "Guardian" was
ed as a search aircraft for anti-submarine
ions. Two models were flown, AF-2W equipped
electric gear served as a "hunter" while the
AF-2S carried the bombs and acted as the "killer". Powered by a 2,400 h.p. Pratt & Whitney R-2800 fourteen cylinder radial engine. Carries crew of four. Range 1,500 miles—maximum speed 315 m.p.h.

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Wingspan—¾" scale—For "19" to "33" Engines

The "T-6" has been taught more people to fly than any other airplane. Hundreds of thousands of pilots who flew this plane will thrill to see this model perform. Beautiful to look at and easy to handle. With its stunt airfoil, it can do everything in the rule book.

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his new Air Force Trainer aligns itself on the
Step-Keel, included in kit. Tri-cycle landing
ear, metal cowl, bubble canopy, U-Control.

$5.95

Beech Aircraft's T-34A "MENTOR"

For .14 to .29 Engines — 33" Wingspan 1" Scale

Proportions of the T-34A are perfect for Controline flying. Easily assembled by the "Step-Keel" method, the fuselage is balsa planked. The wing is reinforced to absorb landing impact. "U-Control" is used together with the optional "Autotrol" Rudder system. Decals are complete and include even the smallest details.

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If no local dealer is convenient, mail orders will be filled by Berkeley Model Supplies, Dept. MA, West Hempstead, N. Y. Please include 25¢ packing & postage.

Lafayette Radio has perhaps the largest selection of electrical components for building circuits. For the beginner, and advanced builder, the Broadfield RC Field Box by Broadfield Air Models, Ashland, Mass., will provide the convenience of your workshop when you're out on the flying field. A place to hold the model and plenty of drawer and storage space are available at waist height. It is hoped that this resume of RC equipment will help the newcomer get a good start!

Fig 1 comes from Kelly Day, 16 Gilmore Blvd. South, Wappingers Falls, N. Y., and gives a circuit for a most valuable piece of bench-test gear. Many builders and designers sometimes have trouble getting their pulse system to work properly. If they build it from published plans and it still doesn't work like the article claims, this unit will probably solve their problem. First of all, we'll point out why a relatively simple pulse-length system sometimes does not operate like it's supposed to. The pulse length at the transmitter may be perfect, say 50-50 on, off. When the signal reaches the receiver, the receiver may change the characteristics of the pulse and the relay used will definitely affect the pulse length. Proper relay adjustment is essential. This pulse-length tester will tell you if you have a 50-50 pulse and if you have the same degree of change at each extreme of your control. In addition to the circuit shown, a vacuum tube voltmeter must be used. The capacitors must be of good quality and are preferred to be matched. The pair of 1-megohm resistors across the output must be matched to within a few percent, otherwise a variable pot is used. Now for the operation of the tester. Set the VTVM to midscale before hooking into the tester. Note the reading as the armature is in the no-contact position. Hold the armature against the other contact and adjust the 1-meg pot until an equal swing is obtained. With the relay pulsing in the normal manner, at a frequency of about 3-10 cycles, the needle of the meter will remain at the midscale point when 50-50 pulses are received. A slight quivering of the needle will be had if the pulse rate is too low. If equal swing is obtained on each side of center when the control is advanced to both extremes, your receiver and relay are functioning properly. As mentioned before, proper relay adjustment is necessary for pulse work and there will be a variation in receiver characteristics, even between tubes in the same receiver.

Dick Allen and Ralph Jackson of Vestal, New York, use small pieces of sandpaper, cemented to the sides of their fuselage, as a gripping surface during launching. The sandpaper can be doped the same color as the fuselage and therefore will be inconspicuous. This is just the thing to keep that 6-pound plus job from slipping out of your hand prematurely during a launch.

NEW ITEMS

Every once in a while, a really new development in RC gear comes along. Now it is the Robot Synchro. This unit is made and distributed by Valley Electronics, 729 Delano Avenue, Vestal, New York. This 5-ounce unit, mounted on a 2½" x 2½" base, is driven by two low-drain motors which always travel in the same direction and are never in a stalled condition. Operation may be had on 3 to 6 volts, utilizing a pulse rate of 5 to 10 cps. The response time from one extreme control position to another is but 1/3 second. This unit is well designed and the workmanship is excellent. Powerful enough for the largest boat or plane, this $14.95 unit promises to be the biggest seller in the

pulse actuator field, especially for those desiring the ultimate in control actuators. This is a self-neutralizing and fully proportional actuator, and as we mentioned in a previous column, this unit won first and fourth place in rudder only at the New York Mirror Meet in 1956.

If you are located in an area not served by a hobby shop and decide to fiberglass that new boat or plane, try Montgomery Ward. Fiberglass and resin kits are available in various sizes and the prices are reasonable.

Looking for a 6- or 12-volt vibrator supply? Then get the best buy in a kit, the new Heathkit unit, Model VP-1-6 or VP-1-12 sells for but $7.95. The output is 260 volts DC at 60 ma and all parts are included for building a quality item. Measuring about 4" square by 4½" high, these units can be used with the regulated power circuit given in the February column. Heathkits are produced and distributed by the Heath Company, Benton Harbor, Mich. and are fully guaranteed. No surplus parts are used, such as found in some RC kits.

The new Babcock Servo-Motor, selling for $12.50, measures 1⅞" square by 2" long and weighs but 2 ounces. This traditionally well-built piece of Babcock equipment is used for trimmable elevator work, engine control or for any other spot where about ⅝" of travel and a one-pound pull are desired. Compactly packaged in an aluminum case, this 3 volt unit will not jam in extreme positions.

For those of you who have enjoyed the Broadfield RC field box, there is now another companion unit in the offing. This could be aimed towards the users who still cling to their 'fishing tackle' box. It is a portable field table, measuring about 4" thick by 14" x 30" when folded. Unfolded, it provides a large table top surface for field servicing and repair work. Broadfield Air Models, Ashland, Mass., should have these ready for spring flying and the price is stated to be less than that of their field box. This company seems destined to provide all the comforts of home right out on the flying field.

Annual, Mid-West Winter RC Convention, usually sponsored by the Radio Control Club of Detroit, this year will be held on Saturday, March 9th, under joint sponsorship of this Club and the Weak Signals, Toledo, Ohio. Over 300 people expected to attend. Site is Trilby Log Cabin, Alexis and Secor Roads, U.S. Route 23-24-25 Bypass, Toledo, Ohio. Program of talks, excellent color movies of the Nats RC. For info, write Ernie Kratzet, 482 St. Clair, Grosse Pointe 30, Mich.

And, from Ernie, news of new Bramco equipment to be shown at Hobby Industry Trade Show. One item is 8-channel receiver weighing 7 ounces with a filament drain of 10 ma. Also, simultaneous transmitter, control box with pulser for proportional rudder. And a single-channel receiver idling at .5 ma with rise to 5 or 8 ma, depending on B-voltage.

"MODEL OF THE MONTH" by Berkeley

AERONCA "C-3"

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TWO SIZES TO CHOOSE FROM:

"KING SIZE FLYING SCALE"

1½" Scale — 54" Wingspan

AERONCA "C-3"

For Radio Control — Free-Flight — Controline

.099 Engines R.C. — .074 Free-Flight — .15 Engines Controline

Designed for rudder control with optional elevator and motor control. Ailerons can be set for trim. Advanced R.C. flyers may wish to servo-actuate the ailerons. Takes up to Tone-Aerotrol size receiver. All equipment easily accessible through the cabin. Controline version is fun to fly with motor control.

Kit No. 3-5

$5.95

less wheels

Oftentimes called the "Flying Bathtub", the durable little Aeronca "C-3" has winged its way across the airways for over a quarter century. Its open cabin and distinctive appearance make it easily recognized on many airfields to this day. It has made a place for itself in light plane history, and is treasured among the pilots who know this historic plane best.

"½A" CHAMPIONSHIP FLYING SC

1" Scale — 26" Wingspan

AERONCA "C-3"

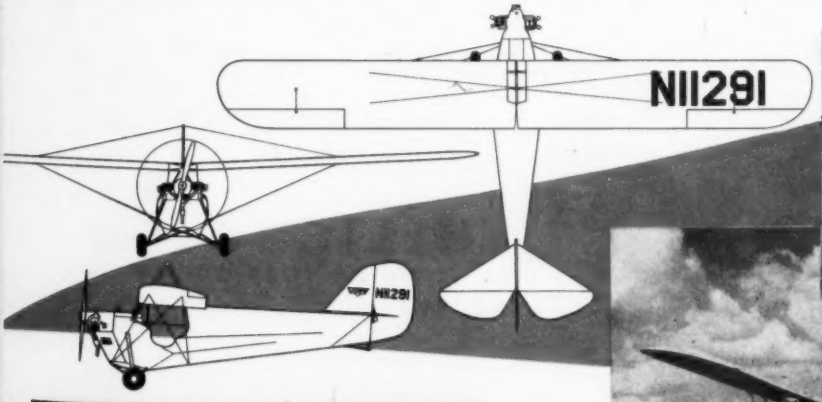
For ½A Free-Flight — Controline

.035 to .051 Engines Free-Flight — .049 Engines Controline

Kit No. 4-12

$2.50

This kit now joins Berkeley 1" Flying [illegible] designs, a series which has won this event at Nationals consecutively since 1938. Simple, the "C-3" can be assembled and flown in a few days time. Flies well with high or low power, free-flight or controline. Plans shown here [illegible]



Since 1933—Leader in Creative Model Kits

BERKELEY MODELS INC.

WEST HEMPSTEAD, NEW YORK, U.S.A.

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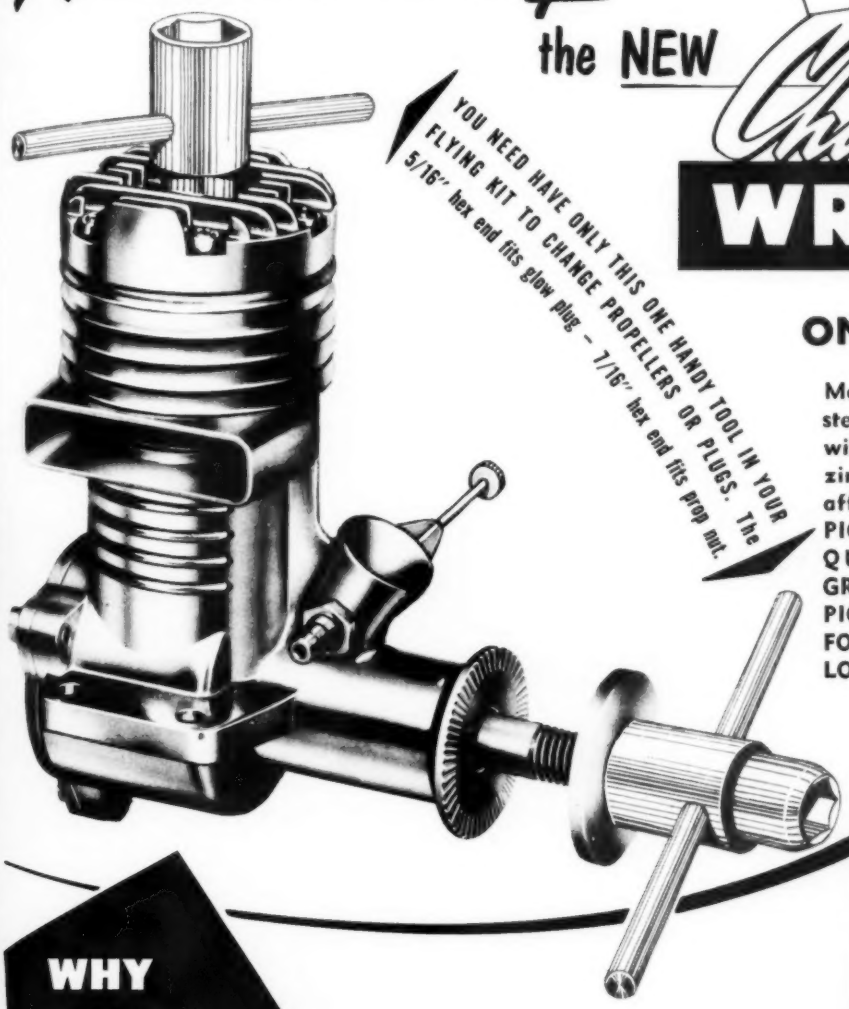
Announcing the NEW Champion WRENCH



YOU NEED HAVE ONLY THIS ONE HANDY TOOL IN YOUR FLYING KIT TO CHANGE PROPELLERS OR PLUGS. The 5/16" hex end fits glow plugs – 7/16" hex end fits prop nut.

ONLY 60¢

Made of quality, heat-treated steel. Don't confuse this wrench with those made of die cast zinc, cheap sheet metal or tube affairs. THIS NEW CHAMPION WRENCH IS ANOTHER QUALITY ITEM IN THE GROWING LINE OF CHAMPION PRODUCTS. WATCH FOR OTHER ITEMS TO FOLLOW.

WHY TAKE CHANCES? . . . USE FOX SUPERFUEL

Fox Superfuel — the number one choice of George Aldrich, 3-time Nationals Stunt Winner . . . first choice of Bill Cummings, 2-time Nationals Stunt Winner.

85¢ pint

Champion PRODUCTS

P. O. BOX 1175-A
FORT SMITH, ARKANSAS

MANUFACTURED AND GUARANTEED BY

Berkeley's RADIO CONTROLLE

FLYING SCALE Desig

FOR RADIO CONTROL — FREE FLIGHT and CONTROLINE

These designs have been selected as ideal for Rad Control flying. Thrill to the majesty of a perfect sc replica as it wheels to your command high overhe

CESSNA "172"

- **Adjustable Ailerons** for manually setting trim
- **Operating Wing Flaps** radio or controline actuated
- **Laminated Structure** stronger, lighter, easier

To lighten, strengthen and simplify assembly, the areas you would normally have to plank or carve from block are now die-cut laminations.

$7.95

BIG 1½" SCALE — 54" WINGSPAN FOR .09 to .19 ENGINES

Here is the latest scale "Cessna" that is a "natural" for radio control. The big proto ship takes-off and lands with "hands-off" control. The model handles just as easy! It's a model builders dream ship!

The kit is very complete in true Berkeley tradition with prefabricated wood parts, silkspan, landing gear and hardware, plus the super-detailed plans and full-colored authentic decals found only in Berkeley Kits.

NAVION "Super 260"

For .29 to .35 Engines Radio Control

For .23 to .29 Engines Free-Flight

For .29 to .65 Engines Controline

(U.S.A.F. designation: L-17) A four place business airplane also used by the U.S. Army and Air National Guard. Originally built by North American Aviation. Power—260 h.p. Lycoming. Maximum speed—163 m.p.h.

$15.95

2" Scale — 68" Wingspan

This beautiful scale replica of the famous "Navi a fast, rugged and truly different R.C. or Free design, easily adapted to Controline Flying. Th its flashing performance and smooth response. free-flight, it will give you experience and confi in low wing designs. Big, roomy, and well engine it will set the pace whenever it's flown. Easy to

$9.95

Radio Control — Free-Flight — PAA-Load

.15 to .25 Engines—71" Span—2" Scale

"PIPER CUB J-3"

The "Piper Cub J-3" needs no introduction. Most famous of all light aircraft, it's a natural for R.C. or Free-Flight flying. The six foot span permits the extra R.C. installation that you dream about. This is a rugged, detailed, flight proven design. Full-Size Plan with R.C. installations, Authentic Decals, etc.

Army Liaison YL-24

"HELIOPLANE" $3.95

Variable Camber Wing for Two-Speed Radio Control Flying

For .049 to .14 Engines — 39" Wingspan — 1" Scale

The "Helioplane" is the first model that permits the use of scale wing flaps. Depress 10 degrees for free flight; 25 degrees for slow speed control by radio; or raise wing flaps 5 degrees for high speed flight!

48 in. Wingspan

De Havilland

"BEAV

- **Formed Metal Ring Cowl**

This high aspect-ratio Canadian Bush Flying type airc is in use by the U.S. Air Force. As a scale design, proportioned and capable of contest performance. In Controline flying, its long moment arm make it ideal landings with motor control, Metal Cowl, Full Size Pl

Radio-Controlled, Free-Flight, Controlline

Radio-Controlled, Free-Flight, Controlline

Piper

"TRI-PACER"

44 in. Wingspan .035 to .15 Engines **$5.95**

This perfect scale R.C. design may be built as a Free-Flight or Controline version if desired. Full Size Plans cover special details for all three versions. Flaps, elevator, rudder, motor and nose gear may be operated by R.C. Ailerons for trim, cabin door access to Radio. Highly Pre-fabricated, Authentic Decals.

$12.95

CESSNA "170"

Radio Control — Free-Flight — PAA-Load .25 to .35 Engines — 72" Span — 2" Scale

Controlling your "Cessna 170" by Radio is a thrill you will not forget! Perfect in scale, rugged, stable in all attitudes, yet responsive in control, with good wind penetration qualities. The gear location is ideal for extended take-off runs. The larger than average size makes it easier to control in windy weather.

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